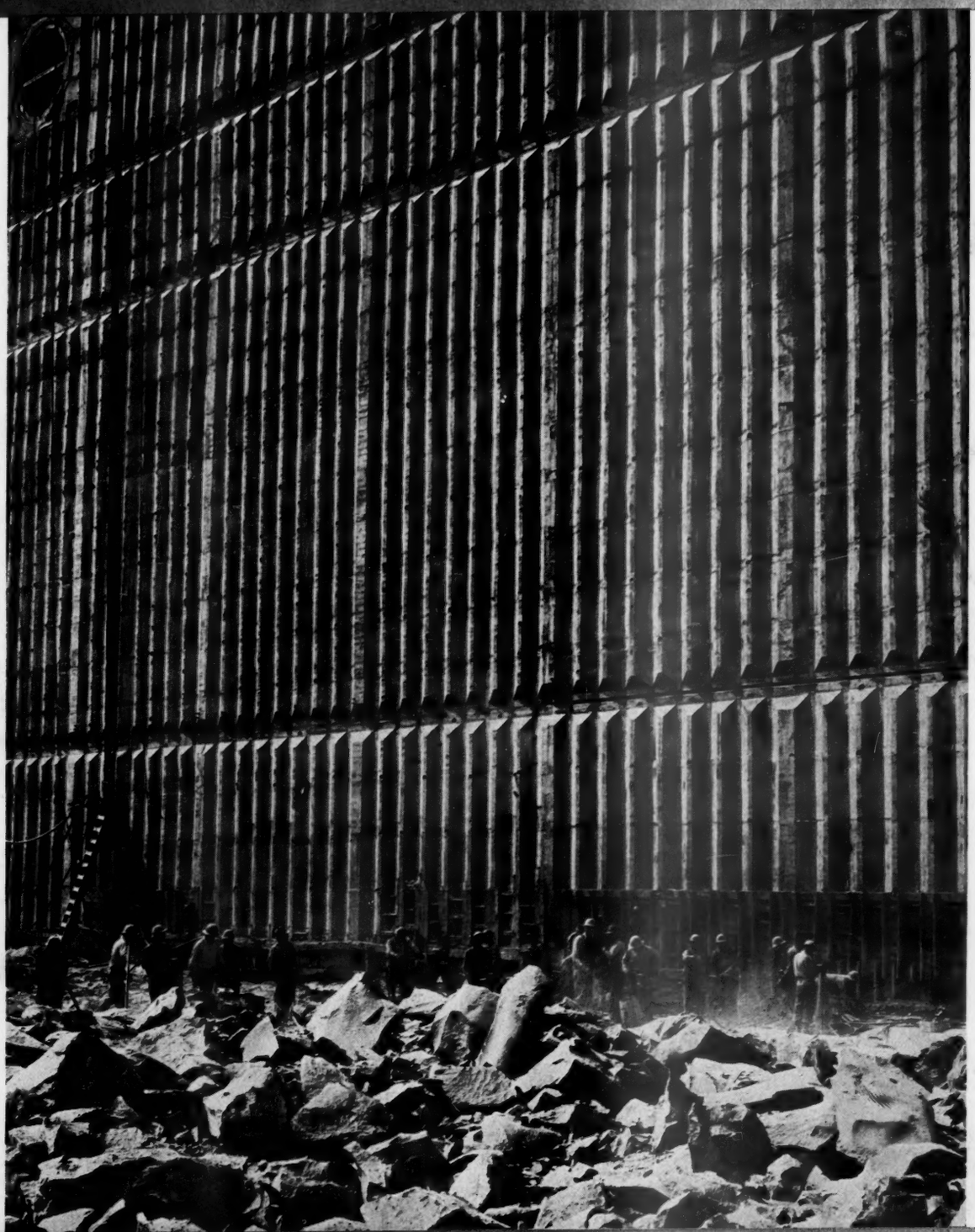
THE AMERICAN ENGINEER

SEP 20 1937



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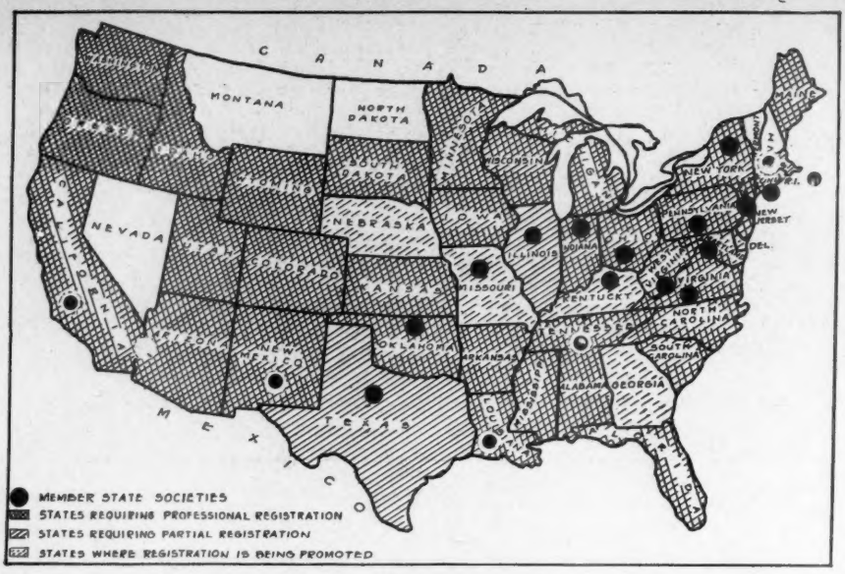
THE NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS



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THE AMERICAN ENGINEER

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Photo from: Bureau of Reclamation, Department of the Interior, Washington, D. C.

THE COVER

Grand Coulee Dam which is being constructed in Eastern Washington on the Columbia River, will eventually irrigate 1,200,000 acres of Columbia Basin lands. Its fluted wall like a giant pipe organ dwarfs the crew of workmen employed in leveling off the bedrock for the next section of the dam. When the next block is constructed, it will lock into the slots left in the joint which are seen in this picture. This great structure, nearly three-quarters of a mile long, will be approximately 550 feet high, when completed (the height of the Washington Monument), the water surface of the Columbia River being raised 355 feet.

The American Engineer assumes no responsibility for statements or opinions expressed by contributors. Their names identify the source of the same.

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NEW YORK STATE SOCIETY SECURES OFFICIAL COOPERATION IN LAW ENFORCEMENT

REQUEST

July 17, 1937.

Dr. Harlan H. Horner,
Commissioner of Professional Education,
Albany, New York

Dear Dr. Horner:

Some weeks ago it was agreed that I should furnish you the names of the superintendents of buildings—building inspectors of various cities in the State where it was intimated to us that plans and specifications for the construction of buildings in excess of thirty thousand cubic feet were being filed without the stamp and signature of a registered architect or licensed professional engineer.

This is the list of the cities and the names of the officials on whom we wish one of your inspectors would call to investigate as to that which had been intimated to us concerning the filing of plans without licensed endorsement.

We would appreciate it if you would have one of your inspectors call on each of these men and invite to their attention the provisions of the licensing laws—the provisions of the recently enacted Feld bill and such other matters as your investigator thought wisely of. We believe it would be advantageous to the public to examine the files and plans in some of these offices to ascertain if violations are being perpetrated and to renew the visit and inspection as frequently as your investigator thought essential to accomplish the fulfillment of the statutes.

Sincerely yours,

ALFRED E. ROCHE, *President.*
New York State Society of Professional Engineers.

COOPERATION

July 22, 1937.

Mr. James Finn,
Superintendent of Buildings,
Albany, New York

Dear Mr. Finn:

May we call your attention to Articles 55 and 56 of the Education Law which regulate the practice of Professional Engineering and Architecture in this State, copies of which are enclosed, and particularly to sections 1450 and 1476.

We ask your continued cooperation in refusing to accept or approve plans for:

Building or structures costing more than $10,000;
Buildings or structures exceeding 30,000 cubic feet in volume;
Alterations costing more than $10,000;
Alterations involving a change affecting the structural safety of a building or structure;

unless such plans have been prepared by and bear the seal of a duly licensed architect or professional engineer.

If any plans come to you that seem to indicate a violation of the law, we shall appreciate it if you will hold them and let us know in order that we may have an opportunity to conduct an investigation.

Very truly yours,

HARLAN H. HORNER,
Assistant Commissioner of Professional Education, Albany, N. Y.

(Similar letters have been sent by Dr. Horner to the Superintendents of Buildings in all of the cities of New York State, at the request of the New York State Society of Pennsylvania Engineers.)

EDITORIAL . . .

THE PROFESSIONAL ENGINEER AND NATIONAL PLANNING

Brookings Institution, in a recent report, recommends that rivers and harbors problems, including flood control, be taken out of the hands of the Corps Engineers of the Army and placed under civilian engineers.

This may be a forerunner of recommendations by the Administration to Congress to place all public works in the hands of civilian engineers and place the military engineer on strictly military affairs. The National Society of Professional Engineers is deeply interested in the profession of engineering and cannot, as a Society, take sides in such an issue.

It may, however, with easy grace, laud the work of the Corps of Engineers of the Army in its rivers and harbors work and its studies, reports, design and supervision of construction of flood control works.

The general public has a strong feeling of confidence in the unbiased judgment of the Corps of Engineers, and in its integrity. It is probable that there will be strong opposition to the carrying out of the recommendations in the Brookings Institution report.

But such issues emphasize the importance of the Professional Engineer in the planning scheme of the nation.

All engineers should keep abreast of this planning.

Read "Technological Trends and National Policy" including the social implications of new inventions, recently published by the National Resources Committee.

The general conclusion is that National planning must anticipate the scientific changes which are rapidly developing.

We quote: "Many works and structures for transportation, flood control, housing and the provision of urban utilities and services, heretofore technically impracticable or requiring extensive expenditures, may now become technically available at reasonable cost.

The present advanced position of engineering science and the prospects for its super-growth support such an assumption.

ENGINEERS—OURS IS THE TORCH LET US BEAR IT ! !

—R. H. C.

NATIONAL SOCIETY NEWS

NATIONAL COUNCIL OF STATE BOARDS OF ENGINEERING EXAMINERS

OFFICIAL ANNOUNCEMENT

Eighteenth Annual Convention

PLACE—Scranton, Pennsylvania. The Hotel Casey has been designated as convention headquarters. Write direct to the hotel when making your reservation.

DATES—October 11, 12, 13, 1937.

TRANSPORTATION—Consult your local railroad ticket agent for lowest fare. From points in western states there may be available summer excursion fares. From points in the southeast there is available round-trip, fifteen-day limit tickets on sale daily at reduced rates.

PROGRAM—Registration of delegates will begin at 9:30 A. M., October 11, and the first business session will start at 10 A. M. There will be a business session on the morning and afternoon of the first and second days. The third day will be reserved for sightseeing and inspection trips with a luncheon, this part of the program being in charge of the local committee of which A. B. Clemens is chairman.

Business to be considered will include reports of the following Standing Committees: Accredited Engineering Schools, Uniform Examinations for Registration, Legal Procedure, National Bureau of Engineering Registration, Engineers' Council for Professional Development, and Constitution. The Committee on Registration Bureau will submit a report on the proposed procedure and requirements for the Bureau and the Committee on Examinations will have a comprehensive report on examinations. The afternoon session of the second day will be set aside for round-table discussions of problems of administration and enforcement of registration laws.

The annual banquet on the evening of October 11 will be an outstanding feature this year. Colonel Willard Chevalier, Vice-President of *Engineering News-Record*, will be the principal speaker and President J. S. Dodds will make a special report on the "Purposes and Activities of the National Council." The presidents and the secretaries of the national engineering societies will be honor guests at the banquet. Colonel C. E. Myers, President of the Pennsylvania Board will be toastmaster.

T. KEITH LEGARE,
Executive Secretary.

THIRD ANNUAL CONVENTION OF THE NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Friday and Saturday, October 8 and 9, 1937, Hotel Commodore, City of New York, will be the time and place of the Third Annual Convention of the National Society of Professional Engineers. Arrangements are now in progress with a view to making the occasion a memorable one.

The New York State Society, which is sponsoring the Convention, has appointed a Committee consisting of Vice-President Fred. K. Zurmuhlen, Chairman, and the Presidents of the seven metropolitan Chapters. The success of the Annual Meeting of the New York State Society at which some eight hundred (800) persons attended the luncheon and which was under the direction of Mr. Zurmuhlen, is evidence of the Chairman's qualifications for the task that he has accepted at the request of President Sheridan, of the National Society. and President Alfred E. Roche, of the New York State organization.

An exhibit will be held on Friday and Saturday. It is proposed to hold business sessions on both days with a luncheon meeting to be addressed by distinguished personages on Saturday in the Grand Ballroom of the Hotel Commodore. This arrangement has been made with a view to affording visitors an opportunity of seeing New York on Saturday afternoon and Saturday evening. A dinner meeting of the Officers and Directors will be held at the Hotel on Friday evening, October 8th.

The return of Secretary Willard S. Conlon from a most successful nation wide tour will make it possible to offer interesting and definite information on the condition of the profession and of the National Society throughout the country. With eighteen (18) States now affiliated (August 21, 1937) and others expected shortly there is reason to believe that from a viewpoint of interest and attendance this Convention will be the largest gathering of its kind ever held in the United States.

Every State will it is hoped, send official representatives to New York.

CONVENTION NEWS

2D ANNUAL CONVENTION OF THE PENNSYLVANIA SOCIETY OF PROFESSIONAL ENGINEERS AUGUST 21, 1937

HERSHEY, PENNA.

The second annual convention of the Pennsylvania Society of Professional Engineers was held at Hershey, Pennsylvania on August 21, 1937. F. H. DeChant, President of the State Society, presided. The morning meeting was opened by addresses of welcome from the State President, A. Bowman Snavely, President of the Harrisburg Chapter, Robert Hall Craig, Past President of the Harrisburg Chapter.

Samuel I. Sacks, of the Philadelphia Chapter, gave a very complete report on legislative matters of importance to the Engineer which have occurred during the past year; he also reported that over two-hundred complaints regarding the mis-use of the word Engineer have been taken care of by his office, and submitted to the State Board for the proper action; he also reported that cases of illegal practice on the part of non-registered Engineers have been settled upon recommendation to the State Board for the registration of Professional Engineers; he also reported on the efforts and actions of the Operating Engineers to obtain registration laws identical with the present laws for the registration of Professional Engineers.

Reports on activities in Pennsylvania Chapters were given by representatives of the Pittsburgh, Philadelphia, Reading, Lehigh Valley and Harrisburg Chapters. Wilkes Barre was the only Chapter not reporting.

A Review of 1937 Legislation in Pennsylvania was presented in a paper by S. Edwin Hannestad, an attorney from the Pennsylvania Legislative Reference Bureau.

At 1:00 P. M., a luncheon was held in the Hershey Golf Club which was attended by eighty Engineers from Pennsylvania and surrounding States, and their wives.

The luncheon was followed by the presentation of the President of the National Society, Arthur V. Sheridan, by President DeChant. Engineer Sheridan, in his address, spoke of the ideals of the Engineer, the National Society, and the State Societies, and emphasized that the Professional Engineer should not overstep his duties as a member of the Society and should let the technical side to the Technical Societies, and that he should instead cooperate with his Chamber of Commerce and community organizations.

Following the address by Engineer Sheridan, President DeChant introduced visiting Engineers and guests from neighboring States, who gave short addresses. Engineer Harry E. Harris, Secretary of the Connecticut Society of Professional Engineers expressed the appreciation of his Society for the help given by the Societies of neighboring States, in organizing the Connecticut State Society, and also suggested that the time has arrived for the introduction of an initiation fee for new members. Engineer Alfred E. Roche, President of the New York Society, spoke of the common bond between the New York and Pennsylvania Societies: he also spoke of the necessity of Technical Societies to attend to Technical subjects and that the Societies' duties are those of Public Relations and Sociology. Engineer Ernest F. Fox, Secretary of the New York State Society gave a short talk on the ideals of the Society.

Another Guest speaker of the Convention was Architect Edmund R. Purves, President of the Pennsylvania Association of Architects, who spoke of the relationship of the Engineer and the Architect and the ideals which are closely allied to both organizations.

Following the luncheon and addresses, an informal business meeting was held which concluded the business sessions of the convention.

The convention committee included Engineers Irvin H. Geiger, Paul Witmer, William S. Hammaker, H. Hershey Miller and E. Thomas Baker. The ladies' committee was headed by Mrs. A. Bowman Snavely.

J. M. MOLTZ

T. U. TAYLOR—A Life Sketch

The subject of this sketch was born in Parker County, Texas, on January 2, 1858, in the border land of the Comanche Indian Territory. He was born in crude surroundings, on a dirt floor, his people coming from East Tennessee in 1856. At the age of four he saw his older brother saddle his horse and ride to the east to join the Southern armies. On the same day his father saddled his horse to go to defend settlers from the Comanche raids. The brother sleeps on Missionary Hill, and the father is in the cemetery at Weatherford, Parker County, with an Indian arrow in his shoulder blade.

The Taylor family moved to Cleburne, Johnson County, in 1870. When the family fortunes were so depleted, the mother tried to support the family of five with her needle, supplemented by the labor of the subject of this sketch—carrying water to the opening saloons at four in the morning, and working in a brick yard the balance of the day. In 1872 he was sent to Fannin County, to the home of a blue Presbyterian uncle, one of the cardinal doctrines of whose faith was that everybody had to get up at four o'clock in the morning, winter or summer. It was severe discipline, but it was heroic pioneer methods. After working four years on the farm, he had saved enough to go to school at Carlton Seminary in Bonham for one year. This time was extended to two years; and at that time his thirst for an education was so highly developed, that he won a scholarship in the new State Teachers Institute at Huntsville, Texas, from which he graduated in the class of 1880. Here the late O. H. Cooper planted in his soul the seed corn of a University education, and in 1881 he entered the University of Virginia, from which he graduated with a degree of Civil Engineer in 1883. On the day of his graduation he was appointed teacher of physics and engineering in the Miller Manual Labor School in Albemarle County, Virginia. After teaching here five years he was elected adjunct professor of applied mathematics in the University of Texas. This was soon expanded to civil engineering and later to the College of Engineering, of which he was Dean from 1906 to 1936. The engineering grew from twenty-two students in 1888 into sixty times that number at the beginning of 1936-1937.

T. U. Taylor's most valuable contribution to scientific lore of the world has been his investigation of silting of actual reservoirs. In 1897 he made the first measurements in the history of the world on an actual reservoir. These measurements were made on the old Austin Lake that stretched in a snake-like form for a length of nineteen miles, with an average width of one-fourth mile. These measurements were published in the U. S. Geological Survey Water Suppy Papers, in the news, and referred to in many books, even in a publication in India. Dean Taylor kept up these measurements on the old lake at Austin and also the new lake, and later extended his investigations to other reservoirs. These investigations were published in a bulletin, "Silting of Reservoirs," issued by The University of Texas. Other publications of Dean Taylor's are:

Books;

Prismoidal Formulas and Earthwork
Trigonometry (with Charles Puryer)
Surveyors Handbook
Backbone of Perspective
Chisholm Trail and Other Routes

Bulletins:

"Austin Dam in U. S. Geological Survey"
"Irrigation Systems of Texas"
"Underground Waters of Texas Coastal Plain"
"Water Powers of Texas"

Bulletins of The University of Texas:

"Good Roads"
"Run-Off of Texas Streams"
"Silting of Reservoirs"
"Water Powers of Texas"

Dean Taylor was born on the old cattle trail that lead from South Texas to Abilene, Kansas, and later to Dodge City. Within the last year he published a book on "The Chisholm Trail and Other Routes."

Dean Taylor's chief motto in life has been that the greatest seed corn in American University life is the poor boy. His chief work for forty-nine years has been keeping boys out of trouble.

WHAT!—NO PHOTOGRAPHS?

In submitting sketches to The Editor for our "Who's Who" page, be sure to send along a photograph. Many of the State Societies have not responded to our request for life sketches. Here is a good chance for national recognition of the various state societies—also an ideal way to pay tribute to those men who have contributed to the growth of the profession.

Current Opinion

ENGINEERING FEATS

American Achievements Are Too Often Forgotten

Reprint from The New York Times

To the Editor of the New York Times:

Topics of The Times some time ago posed the question: "What country has produced the most famous engineers of the last 100 years?" The categorical answer is "France, with de Lesseps and Eiffel."

The obvious comeback is to inquire who completed the job at Panama that was too much for de Lesseps. But examining the question more closely, I am inclined to believe the answer correct. The French engineers named are undoubtedly, even in this country, the most famous of the nineteenth century.

That is a sad commentary on the way our histories are written. In the last 100 years this country has undergone a development never equaled in history, and among the men who made possible that development are some of the greatest engineers of all time.

Back in the earliest days of railroading, George Washington Whistler came into prominence for his ability to build railroads cheaply and well. After years of work along the eastern seaboard, he was called by the Czar to go to Russia and construct the railroad from St. Petersburg to Moscow. He completed the project on time, to the everlasting credit of American engineering methods and men. Today nine persons out of ten connect the name of Whistler only with the famous artist, his son.

Manhattan's Water Supply

In 1842 John B. Jervis brought the sparkling water of the Croton watershed to Manhattan. Forty miles of aqueduct, with sixteen tunnels, a high dam, and a great distributing reservoir on Murray Hill, the present site of the Public Library, truly a work of genius, and one upon the successful completion of which the future health and growth of the city depended.

Chicago, a city built on a swamp, was stifling in its own refuse in 1855. It had reached its limit of growth; cholera and plague were constant threats. To Ellis Sylvester Chesbrough, father of the sanitary engineering profession in America must go the credit for making that city once again decently habitable and capable of growth.

In the middle of the nineteenth century Lowell, Mass., was the largest industrial center of the country. It owed its greatness to the water power of the falls beside which it was built, and for forty years the control and development of that water power were in the hands of James Bicheno Francis. The Dictionary of American Biography refers to him as "the most efficient factor in assisting Lowell to its industrial importance—in fact, he was the maker of Lowell." His later contributions to the perfecting of the hydraulic turbine put the United States in the lead in the manufacture of that type of prime mover for many years.

Eads Built Iron-Clads

At the outbreak of the war between the States, Lincoln called on another civil engineer, James Buchanan Eads, to build a fleet of iron-clad steamers—the first of that type to be constructed by the United States. Eads built eight of them in one hundred days. He should also be remembered for the construction of the first bridge to span the Mississippi; built in 1874, it is adequate for the traffic demands of the present day. Many of the modern methods of caisson work can be traced back to his ingenious innovations.

To the Roeblings, father and son, goes the credit for the developments that have made possible the mighty suspension spans of the twentieth century. Their own magnum opus was, of course, the Brooklyn Bridge. The elder Roebling lost his life in its construction, and the younger completed the task.

And so I might continue, but these few illustrations are perhaps enough to demonstrate my point—that for great engineers deserving to be "famous" one need not look beyond the sea. In a very real sense it is these men who have actually made the United States.

DON JOHNSTONE.

Plainfield, N. J.

AN ENGINEER'S CAREER VALUED AT $95,300

Columbia Survey Indicates a Banker Could Lend That Sum on Pledge of All Income

On the basis of income and working life span statistics gathered by Professor Harold F. Clark, in charge of Educational Economics at Teachers College, Columbia University, it is now possible to predict how much a budding doctor, lawyer, engineer or architect is worth as an investment when he starts his profession.

To develop means of guiding students more accurately into paying professions, Dr. Clark, aided by a troop of research workers, studied 4,400 magazines and several thousand books on occupational incomes in American and European libraries. They maintained close contact with officers of many occupational associations.

After spending eight years in surveying sixteen selected occupations, Dr. Clark came to the conclusion yesterday that the present estimated value of the future life earnings in the various occupations ranges from $108,000 for medicine down to $10,400 for farm laborers.

A Hypothetical Case

According to Dr. Clark's figures for the medical profession for the years 1920 to 1936, the average work span of a doctor is forty-two years. That being true, the following hypothetical transaction may be imagined between Hiram Jones, ready to begin practice as an average doctor, and a banker:

Young Dr. Hiram Jones enters the banker's office and offers to mortgage himself for his entire career. In return for a lump sum he promises to turn over all his future earnings to the banker. The banker, on the basis of Dr. Clark's figures, would give him $108,000. In doing so, Dr. Clark says, the banker would figure on receiving 4 per cent compound interest on Dr. Jones for the forty-two years, the difference between the lump sum and Dr. Jones's total income being the profit on his investment.

After medicine, law, dentistry, engineering and architecture are the professions with the highest estimated life earnings.

Following is a table of the working life span and the present value of average earnings for a working lifetime in selected occupations in the United States:

Occupation	Working Life Span	Present Value of Average Earnings for a Working Lifetime
Medicine	42	$108,000
Law	43	105,000
Dentistry	45	95,400
Engineering	43	95,300
Architecture	43	82,500
College Teaching	44	69,300
Social Work	45	51,000
Journalism	46	41,500
Ministry	44	41,000
Library Work	46	35,000
Pub. Sch. Teach.	45	29,700
Skilled Trades	44	28,600
Nursing	40	23,300
Unskilled Labor	44	15,200
Farming	51	12,500
Farm Labor	51	10,400

Purpose of the Study

Explaining the purposes of his study, Dr. Clark declared:

"Thousands of people are giving occupational guidance in the United States, both in schools and outside, in utter disregard of or in ignorance of the wages in the different occupations. Directing and employing very able people who must be kept in routine jobs is a good way to create great unrest and disturbance in what was once a smooth organization.

"From the standpoint of organizations and society at large, income is the best measure we have of the relative need in all socially desirable occupations. It consequently follows that people should be encouraged to go into all occupations that have incomes above the average and to stay out of all occupations where incomes are below the average.

"Although the professions may seem to be very badly crowded, in the light of the incomes of unskilled labor, farming and even of skilled labor, there is no doubt that by and large the professions need many more people in them. Professional service is a type of service that people are willing to pay more for because it is scarce."

Open Forum

Dear Editor:

Please find enclosed some news for your next issue.

Your August issue is fine. You are improving as you go along. I suggest that you be on the lookout for an article, "The Engineer and His Relation to Government," by Dean Bush of M. I. T. It has been announced that it will appear in *Electrical Engineering.*

Very truly yours,
HAROLD R. TOWSE,
President, New York County Chapter of the New York State Society of Professional Engineers.

Dear Editor:

It gives me pleasure to transmit herewith Engineer T. U. Taylor's Who's Who for publication in an early issue of the AMERICAN ENGINEER.

Texas Society feels that your page in the AMERICAN ENGINEER merits support. For this reason I am requesting that members supply me with their Who's Who in advance of the time that it should be published so that there will be no possible delay.

The Engineers of Texas are looking forward to the appointment of the State Engineers Examiners' Board so that our License Law may be effective. As soon as this Board has been named I will transmit same to you so that it may be published in the AMERICAN ENGINEER.

Yours very truly,
R. S. GUINN,
Secretary-Treasurer,
Texas Society of Professional Engineers.

Dear Editor:

You have invited suggestions from members, asking them how to make THE AMERICAN ENGINEER more inviting and attractive. I have longed for this query, and at last you gave us that opportunity. It is like Shylock at the bar, "Oh, Gracious Editor," give us that opportunity. You have at last opened your bosom to the lay members and invited them to "confer" with you on this most important job.

Let us begin at the front of the magazine, page 2 is good as far as it goes, but why not have a page for all Chapters in the United States, giving their names, officers, their addresses, places and dates of their meetings, so that any visiting member or Chapter can make contacts. Every unemployed member, especially, needs all the contacts he can get to help, aid and assist him to a job.

The "Current Opinion" page is okay and fine, and I want to congratulate you upon the continuity of the articles, a matter much desired by clipping gatherers.

Why not set aside pages for reports of the National Society Board of Directors' doings, chapter activities and reports, and financial statements. Without this information, how do the lay members know whether our society is a going or dying concern, How can we rectify errors of judgment or otherwise, unless we, the lay members, know what is going on behind the scenes?

As to articles published:—each writer should submit his article in briefer form, expressed in fewer words and to the point, like the articles in *Readers Digest.* We are not organized to deal with engineering problems which need "long winded" explanations, but to deal with problems that will attain recognition, prestige, contacts and a living for *all* its members.

Moreover, Some chapters are finding it difficult to sail out this depression. Some are losing more members than they take in. Others have members who are years in arrears in dues. These latter members, when they were thirty yars of age, took out a license and joined us. Now, at forty, they are finding it extremely difficult to get jobs, because civil service commissions and our large monopolistic industrial corporations are hiring much younger men, without licenses and at less pay, thereby throwing the older and more experienced worker on the scrap heap at forty. Why don't you discuss this problem in your pages?

How long can a chapter survive under such conditions and flourish? When the Chapters collapse, the State Society will collapse and the National Society—well, what then? Where will it get its funds?

Remember, all this is going on, while another federation of engineers is increasing in licensed and unlicensed members and flourishing, and getting more members all the time. It's time the Society adopted a more liberal policy.

We can overcome this condition by throwing open our pages, not to a *few members* but to all members who have something worthwhile, constructive and interesting to say, regardless of whether the article is well written or not. As long as the writer gets his idea across, it should be published, provided it is written in an orderly manner, etc.

Therefore, it is the opinion of many that the National Society should set aside a page for forum discussion, for the benefit of those members who live far apart and away from chapters. Sometimes his own chapter needs raking over the coals, to make it more alert. Had that society, referred to above, kept up its forum discussions, it would have been a strong and useful society today. It needed other reforms also.

It is time we also changed our set-up to make it more alert and function, *not for a few* but for *all* of its members.

MARTIN BERNHARDT,
Member of Bronx Chapter of New York State Society of Professional Engineers, 1234 Taylor Ave., Bronx, N. Y. C.

RESULTS

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE
Division of Engineering
Stillwater
August 23, 1937.

Engineer Arthur V. Sheridan,
President, Nat'l Society of Professional Engineers.
County Building,
Bronx, New York.

Dear Engineer Sheridan:

During the last few days I have read your brilliant discussion under the title "Engineers and Tomorrow" as published in the April and May issues of the AMERICAN ENGINEER. I am writing you to tell you our appreciation of your kind words with regard to our New General Engineering Curriculum, and to offer my thanks for your compliments with reference to my part in suggesting and helping create this new program of study.

I am sure that we recognize the limitations of this new course in its lack of sufficient cultural subjects. In order to help develop these cultural aspects of this new curriculum, we are now boosting the English requirements from six semester credits to a minimum of nine semester credits, provided the students can pass certain prescribed tests in English; otherwise, they have to take certain additional courses until these tests can be passed.

As further preparation for entrance to industry, general engineering students, along with the engineering students enrolled in specialized fields, now receive training in physiology and industrial hygiene, qualify for U. S. Bureau of Mines First Aid Certificates, and attend lectures on safety engineering and accident prevention work as practiced in industry, under the sponsorship of the American Petroleum Institute.

I was interested in Engineer Steinman's letter to Dean Steinberg of the University with regard to Engineer Conlon's lecture of "Engineering Registration Laws" before engineering classes, as published on page 23 of the May issue of the AMERICAN ENGINEER. In this connection, I should like to quote from the minutes of our Student Branch of the A.I.E.E., for the meeting of January 11, 1937, as follows:

> "The A.I.E.E. meeting was held jointly with the meeting of the Engineering Society, to hear Engineer C. A. Lashbrook, Secretary of the Oklahoma Society of Professional Engineers, discuss 'The Registration Law for Engineers in Oklahoma.' The speaker was accompanied by Engineer W. F. Smith, a leader of the Oklahoma Society.
>
> "This meeting created a lot of interest among students, and led to many questions in the days following the meeting."

Respectfully yours.
A. NAETER,
Head of Department, and
Member of Oklahoma Society of Professional Engineers.

THE PRINCIPLE OF ALL REGISTRATION ACTS

From the year book of the Engineering Profession in British Columbia, 1937.

The fundamental principle; the keynote of any Registration Act, be it law, medicine or chartered accountancy, architecture, pharmacy or engineering, is the prescribing and developing of a formal system of education for all who would become members of that profession. The actual issuance of a license to practise to the mature man, should be of the nature of a formality. The real work should rest in the years of preparing and developing the student system. More, it is the primary duty of the administrators of any Registration Act, to educate the profession to accept such prescribed system of training as the only system. The system may have one or two variations, the university graduate system and the non-university examination system, but generally the statement stands—it must be the only system. The natural and logical inference follows, that positions suitable to the various grades of the students should be reserved to those students who are taking the system.

The Philosophy of Professional Licensure

By **JUSTIN MILLER**

Dean, School of Law, Duke University

An Address Delivered at the Thirtieth Annual Congress on Medical Education, Licensure and Hospitals, in Chicago, February 12, 1934

Printed by permission of National Council of State Boards of Engineering Examiners, Columbia, S. C., 1937

(*Concluded from August Issue*)

4. Finally to illustrate this point, consider this statement from an address delivered by Chief Justice Hughes at the meeting of the American Law Institute in May, 1932, (Vol. X, pp. 35-36):

"How is society to protect itself against the corrupting influences which tend to render it impotent to perform its primary obligations? That is the paramount problem of today. The Bar with its special knowledge has a grave responsibility to furnish expert guidance and determined leadership in dealing with this problem. The Bar has the capacity not only to instruct but to energize. It controls the needed leverage of acumen and experience. These are hard days, critical days, but they are days in which it is worth while to live and toil,—stirring days! I give you my greetings and congratulate you upon your opportunities."

In the first place it is generally recognized as an obligation of a profession that it should render needed service to persons too poor to pay fees. Sometimes this is done by the individual member, sometimes by agencies set up and supported by the members of the profession in a particular locality, in the form of clinics or legal aid societies.

In the second place, there are always, in each profession, some members thereof who undertake to blaze the way to new discoveries and new techniques. While it is doubtful whether the members of the profession, generally, regard this as a part of the obligation of the profession, they are usually proud of these professional pioneers and eager to honor them for their accomplishments.

In the third place, there are in each profession, certain members who are intensely interested in the relation which the profession bears to the public generally and to various governmental agencies. In the medical profession these are the men who may be found engaged in public health work and in large programs of preventive medicines. In the profession of law, they will be found holding judicial, legislative and executive positions, serving on commissions and in legislative drafting organizations, or sponsoring movements for improvement of social and political conditions. In this group, too, will be found those who in each profession are responsible for the organization and work of professional associations and striving for the improvement of professional education and licensure.

In spite of the indifference, and even opposition, of those professionals who are concerned solely with rendering service to paying patients, it is nevertheless so obvious as to seem to require no demonstration that in the performance of the three functions last mentioned, is to be found a safeguard for the future of our professions of at least equal importance as the rendering of skilled service to individuals. By providing service freely for those unable to pay therefor, a convincing demonstration is given of our non-mercenary character. Hostility, which might otherwise sweep these professions into the discard of disintegration, is converted into gratitude and appreciation, which makes possible even more constructive development for the future. Willingness to assume the task of experimentation and exploration, avoids the dangers of encroachment from proponents of invalid and untested hypotheses. So long as the public is convinced that the members of a profession will make available to it, at the earliest movement consistent with safety, every new discovery of science, the public will give its loyal support.

Willingness to assume responsibility for the investigation and ultimate solution of a problem of great public concern which lies exclusively or largely within the domain of a particular profession, even though it may result in less paying patients, establishes public confidence in the profession and justifies its existence. The success of the medical profession in eliminating great plagues, such as yellow fever and small pox, has done more to dramatize the integrity and usefulness of the profession than all the engaging bedside manner of the ages. The failure of the profession, to reduce the maternal mortality rate, recently revealed by the report of the New York Academy of Medicine, will be charged seriously against it, constituting as it does, gross negligence in the handling of a problem of large magnitude which can be solved only by the members of the profession. (Adair, Jour. Ass'n. of Amer. Med. Coll., July 1932).

For whenever the public suspects laziness, indifference or incompetence, or apparent unwillingness to assume responsibility for problems which have theretofore been assumed to lie within the field of a particular profession, it will look to others for help. Thus may be developed a new skilled service, or thus may the public be despoiled by fakirs. It may regret its waywardness later, but in the meantime it has given the profession a bad hour. One of the greatest trials of the medical profession results from the encroachment of miracle working religionists and psychic and psychological charlatans. And yet, although it is generally known that many medical cases are mental rather than purely physical in character; although we are authoritatively told that over fifty per cent of the hospital beds of the country are devoted to mental and nervous cases, (Medical Education (1932), p. 214), still we find in some medical schools and on the part of many physicians a strange resistence to the experimental work of psychology, and a stupid unwillingness to develop the field of psychiatry. Man's psychic side is his most vulnerable point. (Burnet, Medical Education, etc., II Quar. Bul. Health Organ. League of Nations). He knows that it has much greater significance than science has yet been able to explain. Medical science is almost well aware of that fact. While the profession of medicine cannot be required to perform mira-

cles or solve the mysteries of mental science, it can be, and is, expected to devote a reasonable amount of attention to this field. Its failure to do so is, obviously, unfair to the public, and to the profession itself. If it be true, as has been stated to me, that from forty to sixty per cent of all operations for appendicitis, for example, are unnecessary and that a considerable portion of them could be avoided by proper psychiatric diagnosis, then, verily, the public has only a little more to fear from fakirs than from physicians. Here would seem to be a point where licensure personified in intelligent leadership, should be "putting on the pressure."

One of the most distressing of present-day problems is that of the administration of criminal justice. Lay people assume that lawyers are in charge of the situation and have assumed full responsibility therefor. It is true that lawyers control the judicial and administrative machinery of criminal law enforcement and make some contributions in the legislative field, but in spite of these facts there is not upon their part any conscious assumption of professional responsibility for the whole problem. Many lawyers, specialists in other fields, are proud of their ignorance of everything that relates to the criminal courts. Most of those lawyers who do participate in the administration of criminal law, are quite content with the antiquated procedures and mediaeval concepts which still prevail in that branch of the law. Most lawyers are either ignorant of the newer procedures or opposed to them, and are mainly responsible for the inadequacy of our present machinery of justice. Frankly speaking, the great programs of preventive medicine and public health have no counterpart in the field of criminal law, and it is not unlikely that this branch of law administration may be split off from the rest and taken out of the control of lawyers unless they soon awaken to a greater sense of their responsibility and manifest a more intelligent interest in the solution of the problem.

Already substantial sections of law practice have been chipped away, because of the unwillingness or inability of lawyers to grasp the significance of such problems. Administrative tribunals have taken over a large part of the field of public utility law and the law relating to industrial accidents. A new type of specialist is making inroads in these fields. The same is true of the large and important field of tax law. Methods of arbitration and adjustment have been and are being substituted for judicial procedures in many commercial situations. In other words, although the profession of law is still an aggressive, dominant and highly capable one, there are clear signs of disintegration, definitely attributable to shortsightedness and lack of understanding upon the part of those members of that profession who have been in charge of education and licensure.

With their backs to the wall, and in spite of the low standards of licensure, the lawyers, too, are now using the method which the church once used to protect their borderlands; i. e., laws prohibiting others than licensed practitioners from practicing law. These socalled "unlawful practice acts" have been passed in a number of states and are being pressed for passage in others. In some states they have been decisively defeated; a clear indication of loss of public esteem and evidence of lack of that faith which is necessary to guarantee popular support of a profession. Professions like armies succeed by using militant offensive tactics. An organization which fails to realize such responsibilities, and seeks instead to protect its holdings, solely by building a Chinese wall around them, has reached a point where dry rot has set in.

I have not time to discuss adequately the relation of licensure to education. But I cannot let the opportunity pass to suggest the importance of *pre*-professional training, particularly as a basis for understanding the responsibilities of the professions and learning how to interpret them to the communities. I have heard it said that it is not necessary to instruct pre-professional students in cultural subjects—they get enough of that at home. As a matter of fact, many of them come from homes in which culture is lightly valued. A much more pessimistic but perhaps more truthful point of view is expressed in a recent article in the Journal of the Association of American Medical Colleges, (April 1931), as follows:

> "Our students are the most uninteresting of men. They are ignorant of either art or literature. They only read sporting papers and cheap magazines. They do not even know their own language, nor can they spell. They are in fact, semi-illiterate."

If it is upon such men as these that we are to depend to interpret our professions to the public on the one hand, and to plan its intelligent development on the other, God help us! They will be fully as adequate in the role of professionals as the negro family which split up the doors to the house for fuel and wondered why they were cold. How can such men expect to be convincing in their contacts with the great body of college men and women who now comprise the intellectual leadership of the country; regardless of their skill? How can they relate the technique of their skills to the social, psychic and economic situations which condition the problems of their clients and patients? How can they adequately determine the great problems of organized medicine and the administration of justice?

I promised in the beginning to say little about the content of professional education and I shall keep that promise. After all it is a question which must be settled by each profession for itself and upon a basis both of the scientific development of the content of professional knowledge and of available instructors. A word of caution recently uttered by Roscoe Pound, if followed, might well relieve the curriculum to such extent as to make possible other desirable curricular additions. He said: (19 A. B. A. Jour. 627-8.)

> "Still another persistent difficulty in such discussions as the present comes from a general assumption that education is a process of acquiring information and consequent tendency to stuff programs of professional education with a maximum of informational topics with which, it is felt, the ideal lawyer should be acquainted. It cannot be insisted upon too strongly that education is not primarily, nor indeed except incidentally, the acquisition of information.
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> * * * * *
>
> Expanded curricula and institutions teaching all things to all men are in part a result and in part an exciting cause of this faith in information. Teachers eager to pass on what they have worked out laboriously have cooperated in keeping it alive."

So far as licensure is concerned it should insist that professional and pre-professional education measure up to standards set by competent members of the professions. In view of the present large supply of professional men, there is no possible excuse for continued failure to do this. And there are plenty of members of each profession thoroughly competent to set such standards and to establish methods of examination which will discover compliance therewith. This is the essential point in the relationship between education and licensure.

I am sure that if I had been able to persuade *some* professional men to go this far with me in sketching—

inadequately indeed—the underlying philosophy of licensure, they would now insist that although my thesis may be theoretically plausible, it is nevertheless impracticable. Some of them could be silenced, if not persuaded, by reminding them that I spent several years in general practice, four years as a public prosecutor and two years as a member of the grievance committee of a large city bar association. Others, ignorant and self-centered, would resist persuasion from purely selfish motives. The presence of these men in professional life constitutes the greatest drag on any program for improvement of licensure, and suggests the importance of devising such methods as may be necessary for preventing the entrance into professional life of more of the same kind. We are entitled to inquire closely into the motives of those who offer themselves, and in the absence of a clear showing of understanding of professional obligations and of willingness to assume them, we are entitled to exclude, rigorously. It is true that ability to render skillful service should be the minimum basis, but it should not be the only basis for licensure.

It is at this point that serious conflict usually arises. Unfortunately, the rewards of practice come largely to those who render skilled service to paying patients and who have little interest in other professional responsibilities. It is easy for professional school staffs to fall into the stultifying practice of supplying the "market," because they know that they will be commonly judged on a basis of monetary success. Surely the public and the professions themselves have a right to insist on other educational standards. Members of examining boards, secure in the safety of admitting men who will be able to give convincing evidence of skill in diagnosis or surgery, or in writing briefs for large city law offices, insist that they are not in position to make further inquiries. Deans and professors in schools and colleges insist that their students are too young to have, or to reveal, character defects and that it is impossible to educate men to have understanding of professional responsibilities. They insist, moreover, that the right answer to a question of professional ethics will be given instinctively by any gentleman. To a large extent this is not only untrue, but constitutes deliberate rationalizing to hide ignorance and indifference. The real answer is that we have developed teaching methods—upon the basis of the pioneering of bolder men who have gone before us—which have proved reasonably successful in producing men of professional skill. At the time when these earlier teachers lived, this was their important problem. Today the problem is a more challenging one in a more difficult and complex world. Our very success in following the lines laid out by the pioneers has made us such successful specialists that we are less resourceful in meeting new problems of teaching and licensure. Again, many of the teachers in professional schools today are men entirely lacking in the practical experience which comes from actual contact with the world outside of university communities. Some of them are frankly disinterested in the relation of their professions to society and are even disinterested in the practitioners themselves. Both groups are busily and happily engaged in spinning out the intricate webs of information and theory to which Dean Pound referred. Most of them were afraid to experiment with new methods of education. So they say: it can't be done! there isn't room for it in the curriculum! we don't want to do it anyway! we are too busy reshaping the existing courses! it would be a cheap bid for popularity and stultifying to the ideals of the teaching profession!!!

Much more has been done by way of new experiments in professional education than is generally known, or even than might be supposed from articles in current professional journals. Just by way of example and as suggesting avenues of future development, I will tell you briefly, in conclusion, of two or three of these.

At the Law School of Duke University we have already demonstrated that the selecting and training of students for professional leadership need not be limited to training for proficiency in skillfully serving a client. In addition to providing, liberally, those courses usually found in law schools, as well as the formal courses in legal ethics; we have established other courses, which, in addition to their utilitarian values, are highly revealing of character strengths and defects and highly suggestive of professional attitudes.

One of these courses is our Legal Aid Clinic. Here our senior students render professional service to real clients with real cases. However, the instructor in that course, far from letting it consist merely of a laboratory for the dissection of live cadavers, emphasizes constantly the fact that these are social problems and insist upon an effort in each case to determine causes and work out solutions, beyond the mere legal problem involved. Among other examples may be cited a case which involved the state sterilization law and which eventually resulted in a test case, carried to the Supreme Court, where the law was held unconstitutional; followed by the drafting of a new statute and its passage by the next legislature. Another example is to be found in a group of cases which revealed the widespread operation of loan sharks in the State followed by the prosecution of a large operator and his removal from the state. Participation in the work of this course reveals sharp differences in temperament, character and capacity for professional service and makes possible, intelligent recommendation of graduates to firms seeking young men. Failure to pass this course results in failure to graduate—but it is interesting to note—failure to graduate has nothing to do with admission to practice in North Carolina.

The conventional course in criminal law, which required nothing more from the student than a hurried reading of many cases and an occasional stereotyped recitation, has been converted at Duke into a course in criminal law *and its administration,* in which, in addition to learning the principles of law, the student is required to inquire into the purpose of criminal law in the social process, to investigate methods of administration and to face squarely the issues of a lawyer's responsibility for criminal law making and remaking, in order that society may be best served. Needless to say, countless occasions arise in which misunderstanding is revealed, character defect indicated and opportunity afforded to train and correct.

In addition to these and other courses, there has been organized at Duke a student bar association, of which each student is a member; organized on the plan of The American Bar Association. Although this work is not organized as a course, nevertheless one of our most experienced instructors is giving course credit for assisting in the work of the association and there has resulted a rather remarkable seminar in professional problems with monthly open forums in which heated discussions are held of just such subjects as we are discussing here today. If you have any doubt regarding the possibility of revelation of character by students and of their interest in such subjects, I invite you to attend a few such sessions and see revealed all of the attitudes and prejudices of the members of a typical professional group.

In other words, it is quite possible for us in the educational group to discover for those in the licensure group, not merely ability of the type which has been

tested in the past, but to answer almost any question which you care to ask concerning these neophytes who are in our care. With the backing which well-regulated licensure gives, we can establish such standards of education as licensure requires. Moreover, it is the right of those who administer licensure, to inquire of us and to require of us whenever and whatever their good judgment tells them the occasion demands. The important question is, whether those of us in whose hands now rests the destiny of the professions, are really interested in the underlying philosophy of licensure, and willing to establish the necessary procedures for properly determining, by adequate training and selection, those who are to follow us.

What Ails the Engineer?

By WILLIAM L. ABBOTT

(*Reprint from* "PROFESSIONAL ENGINEER")

William Lamont Abbott, holder of the Commonwealth Edison diamond medal in recognition of fifty years of outstanding service, past president of American Society of Mechanical Engineers, revered by engineers of all ranks, might be called "Engineering's Voice of Experience"—and as such he speaks frankly in this little article reprinted from the bulletin of the Chicago section of A. S. M. E.

The engineer protests that his profession does not receive the recognition to which its importance and its personnel entitles it.

Engineers build railroads and lawyers and financiers become their presidents. Engineers build great bridges and some politician cuts the silk ribbon opening the bridge to traffic. Engineers build a great steam ship and at the launching the glory goes to the young lady who breaks the bottle on the receding prow, and so on down the list of great engineering achievements.

The preacher, doctor, lawyer, politician are in public sight and mind daily while the engineer who makes things and makes them work receives no more attention from those who benefit by his creations than the average liner passenger gives to the engine room watch without whose toil and care the liner and its passengers would get nowhere. The education of an engineer is exacting and cultural. His professional ethics are high and are so recognized, standing well up with what are generally regarded as the "learned professions," and yet he is treated like the old horse that grinds in the mill all day and at night is put away in a dark stable with a ration of shorts and bran while his master eats white bread from flour ground in the sweat of the mill horse's brow.

Such is the plaint of the engineer. The condition is real, but what is the cause? Is there a conspiracy on the part of society to keep him down or has he gravitated to his natural position in professional standings?

Leaving the question unanswered, let me begin in another place: Our likes and dislikes often result from an intangible something related to the matter under consideration. The odor of a rose and the odor of an onion are but infinitesimal parts of the flower and of the fruit. The flavor of a tasty and of a tasteless apple are too small to measure and even the condiment we put into our food to give it a relish is relatively small while the flavoring principle of that condiment itself is extremely attenuated. Going farther and applying this comparison to our friends; one may be an interesting fellow whom it would be a pleasure even to wave to on the street while to another of equal intimacy we might neglect to give any recognition. These acquaintances are alike and act much alike and observe the same conventional amenities, and yet to you they are attractive, repellent, or neutral all due to some inherent quality of personality. That quality, alas, refers to the ability to be interesting and entertaining rather than to ethical uprightness.

Now the average engineer who is interested in doing things well and thereby gaining the esteem of his fellows would revolt at the suggestion to cheapen his profession by the adoption of showmen's methods and yet the fame of not a few of his brothers rests in part on such practice and, too, in all propriety. In person or in the press they appear before the public describing with details of human interest, great engineering projects completed or proposed thereby giving favorable prominence to the whole profession.

The old *Scientific American* with its absurd propositions vividly illustrated was of gripping interest to the laity and Jules Verne's serious absurdities attracted the world's attention to the profession.

How would we change our insipid friend to make him more companionable to his associates and more valuable to himself?

How can we change the engineer to win for him the prominence that he thinks is his due?

If I knew how it might be done I would patent the idea, but in the absence of such an inspiration would suggest that he make himself interesting to the public and that he then consult an advertising engineer for his further guidance and whatever the recommendation may be it will contemplate a minor rather than a major operation.

Readjustments Required for Recovery

Reprint from Public Affairs Pamphlet No. 11, published by Public Affairs Committee, National Press Building, Washington, D. C.*

How stable is recovery?*

Is there still danger of inflation?

Will shorter working hours raise living standards?

Need we worry about foreign trade?

During the past few years the American people have enjoyed a rather striking recovery from one of the worst economic cataclysms of modern times. But though business indices of all kinds register a substantial improvement, we are not back to the 1929 level—much less where we would have been had the depression not overwhelmed us. We are confronted with a situation similar to that which existed in many of our flooded cities a few months ago. After the muddy waters had receded and normal activities had been resumed, it was found that much unseen damage had been wrought. Buildings had been undermined; sand had worked its way into delicate machinery, rendering it practically useless. Weeks after the rivers had returned to their channels, unsuspected but serious damage would be discovered in hidden places.

In much the same way, the crisis has wrought unseen injury to our complex economic mechanism. Our economic system closely resembles a delicately adjusted machine. When each part is properly balanced in relation to the other parts, and when the cogs and wheels are meshed with one another, the machine functions smoothly. But if the mechanism gets out of adjustment at any point, its efficiency is immediately impaired. It then becomes our task to try to repair the dislocation without throwing another part of the machine out of kilter. And we are discovering that this is by no means an easy task. But before we examine the machine as it exists today, it will be helpful to review the fundamental maladjustments which plunged us into the depression.

Our Heritage from the World War

To a large extent our present difficulties originated in the World War rather than in 1929. The war threw the economic machine out of adjustment in three ways: (1) It upset the normal balance of international economic relationships, both within Europe, and between Europe and the outside world. (2) It destroyed the financial stability of many countries. (3) In redrawing the map of Europe, it led to changes in national policies of a far-reaching character.

The war transformed the United States almost overnight from a debtor to a creditor country, while it saddled the various European countries with tremendous financial obligations. It brought about a tremendous expansion in America's productive facilities which were not matched by an increased market. Europe, on the other hand, found its productive resources seriously impaired at a time when its obligations—which could only be met by the fruits of production—were greatly enlarged. To make the situation worse, most European countries were either saddled by a heavy domestic debt or were suffering from the effects of currency inflation designed to wipe out that debt. On top of this, the break-up of the Russian, German, and Austro-Hungarian empires brought into existence a number of small countries, each of which aspired to develop a degree of economic self-sufficiency. This disrupted long-established commercial and financial relationships, and led countries to vie with one another in the creation of new trade barriers.

Post-War Policies

Following the war, the various countries sought to re-establish as nearly as possible the conditions under which the world economic mechanism had functioned smoothly prior to 1914. It was believed that the restoration of the gold standard and currency stability was the essential foundation for such an endeavor. Beginning with Austria in 1922, a series of plans for financial stabilization were put into operation. German and Austrian reparation payments were reduced; loans were extended to these and other countries to make possible the re-establishment of the gold standard. Later the inter-Allied debts were "settled," and new private loans were extended to debtor countries to finance reconstruction and—as it turned out—to enable them to pay interest on their already huge indebtedness.

Early Danger Signals

At first it seemed as if this program was succeeding. The European economic machine was not only restored to full production but, aided by loans, it rapidly surpassed the pre-war levels of activity. But side by side with the measures designed to recreate a sound international economy were others imposing ever-increasing trade restrictions. A World Economic Conference was called in 1927 which urged that every effort be made to reduce tariffs throughout the world. This was never achieved. Two years later—in the spring of 1929—the Smoot-Hawley tariff bill was introduced into the American Congress. This stimulated a new wave of trade restrictions throughout the world which worked at cross purposes with the necessity of increasing trade if the evermounting international indebtedness was ever to be paid.

These difficulties were aggravated by the over-expansion of certain types of agricultural and industrial production. New areas had been brought into cultivation during the war which were not abandoned when European production was brought back to normal. The same applied to some industrial products. As a result, huge supplies of unsold commodities accumulated. Prices, particularly for farm products, were depressed or artificially sustained by government credit.

Within the United States there were also serious maladjustments, the gravity of which was not fully realized at the time. All parts of the population did not participate equally in the prosperity of the twenties. Wages did not increase as rapidly as the growing efficiency of production would have permitted. The incomes of the wealthier groups, particularly corporation officials, shareholders, and owners of large businesses, on the other hand, increased more rapidly than those of the population as a whole, As a consequence, the country tended to save more than was necessary for investment purposes. The groups who were enjoying the largest share in the prosperity of the period did not, as a rule, spend all of their increased incomes on consumption

goods. Instead, a large share of their enhanced income flowed into investment channels where it was not needed in view of the relatively slow growth of consumer-goods industries. It was this superabundance of investment money which was chiefly responsible for such unsound developments as the Florida real estate boom, the sale of all manner of worthless South American and other foreign securities, and the ultimate stock-market boom of 1929.

1929 and After

With the economic machine out of adjustment or vulnerable in so many different places, it was only a question of time until a break would occur somewhere. And once a serious break occurred in such an interrelated mechanism, it was natural that it should affect the entire system. No one can say exactly when or where the depression started. We often think of the Wall Street crash of October, 1929 as marketing the beginning. But Australia and the Dutch East Indies were experiencing a recession as early as the last quarter of 1927. In the following year, Germany, Finland, and Brazil began to encounter difficulties, while the depression appears to have begun in Poland, Canada, and the Argentine in the first half of 1929. In no case, however, was the slackening in business activity in these countries pronounced until after the break in the American stock market.

The recession passed through two distinct phases. The first extended until the spring of 1931, and the second from then until the spring of 1933—the date of the upturn. During the first phase the decline was comparatively moderate—much as it had been in 1907 or 1920-21. It was not accompanied by an actual breakdown of the economic structure. The second stage was marked by a collapse of the gold standard, and by a profound dislocation of the domestic financial structure of many countries.

Until the spring of 1931, there were recurring waves of optimism as to the possibility of early recovery. The slight improvement which occurred at the beginning of 1930 encouraged many persons to believe that the depression was over. In general, it was felt that the economic structure had shown remarkable resiliency in face of such a severe shock as the Wall Street crash.

The sudden collapse which occurred in the second quarter of 1931 was caused directly by the huge burden of international indebtedness. It is conservatively estimated that these debts totalled at least 60 billion dollars at the end of 1930. This meant that approximately 3 billion dollars had to cross national frontiers each year merely to pay interest and amortization charges. The debtor countries had no surplus reserves of gold hidden away; it was becoming practically impossible to float an international loan; so they tried to increase their exports in order to obtain gold or foreign exchange with which to make payments on their debts. But the pressure to sell commodities came at a time when no one wished to buy. This led to a sharp fall in prices and a further decline in trade. The situation was complicated by political uncertainties, such as the rise of National Socialism in Germany which led to a withdrawal of short-term capital from Berlin. The German-Austrian customs agreement, anounced on March 11, 1931, caused funds to be withdrawn from Austria as well as Germany. This laid the stage for the final collapse.

Austria's largest bank, the Kreditanstalt, failed. No financial catastrophes in history have ever had such far-reaching repercussions. Starting in Austria the panic rapidly spread to Germany where a crisis was temporarily patched up with the aid of short-term loans from the central banks of the great Powers. But the freezing of German obligations to Great Britain led speculators to turn their attention to London. A run on the gold stocks of the Bank of England developed which ultimately forced Britain to abandon the gold standard. The collapse of the pound, in turn, compelled a large number of countries which had close financial relationships with Britain to do one of two things: allow their currencies to fall with sterling, or institute a drastic control of all foreign exchange transactions. Some score of countries abandoned gold within a brief period.

It was only natural that such a series of profound shocks to the economic machine should accentuate the existing difficulties throughout the world. Prices continued to decline; trade and production were further curtailed; tariffs and trade restrictions were multiplied. The United States was, if anything, more seriously affected than either the debtor or creditor countries of Europe. Our huge volume of internal debts became relatively greater as prices declined. Farmers were unable to maintain interest payments on their mortgages. Difficulties in tax collections raised serious problems for city, state, and local governments. The railroads seemed threatened with wholesale bankruptcy. Banks and insurance companies were endangered by the defaults on mortgages and bonds. The greater the efforts of banks to save themselves by selling securities, the greater became the pressure which resulted from the decline of security values. After thousands of small banks had failed, runs were started on some of the larger ones until it became necessary, on March 3, 1933, to declare a general bank "holiday" until the panic subsided.

The Beginning of Recovery

Like the depression, recovery did not begin simultaneously in every country, although the turn appears usually to have occurred either in the autumn of 1932 or the spring of 1933. Once begun, moreover, the upswing proved extremely irregular and uneven in the various countries. In the United States, for example, the low point of the depression was reached in July, 1932, but the banking crisis brought a serious relapse in the early months of 1933. After a sharp rise in the late spring of 1933, there was a substantial recession in the autumn. Similar advances and retreats characterized the economic battlefront throughout 1934 and the first half of 1935 when a more pronounced improvement began. Other countries also had their ups and downs though they did not necessarily correspond with those of the United States.

Never in the past has a recovery movement been so slow and halting. As a rule normal economic conditions have been restored in less than half the time that has elapsed since the beginning of the present advance. But neither has any business revival ever continued as long as the present one. Four years have passed since April, 1933, when the movement actually got under way. The longest previous advance was 36 months.

While the upturn has been widespread and substantial, it cannot be said that the fundamental maladjustments in the economic mechanism have been wholly overcome. International trade has lagged far behind the expansion of world production and shows little sign of regaining its former importance. Currencies have remained unstable, and trade barriers have not been appreciably reduced. The durable goods industries have lagged, until recently, well behind those producing consumers' goods. Even yet the building industry is far below normal. There has been an unprecedented increase in public indebtedness as a result of governmental activities to combat the de-

pression. Any chance that this burden of debt would be speedily reduced has been destroyed by the world-wide increase in war preparations. Although military expenditures have played a part in the rise of industrial activity, they cannot be said to make a permanent contribution to recovery. On the contrary, by their threat to peace they imperil the very foundations of our economic structure. We shall take up some of these problems separately.

WAGE AND PRICE POLICIES

After four years of recovery the United States has increased its national income in dollars by about 50 per cent from the low point of the depression. In 1936 our collective income was about 60 billion dollars. If this were divided evenly among the entire population, each person would have received approximately $470—or roughly $1,800 per family. But in 1936 there were important resources which were not being exploited; some factories were running only part time; millions of men were wholly or partially unemployed. If all the unutilized labor power had been employed in productive enterprises, it is estimated that the national income could have been increased by some 20 per cent, giving a potential total of approximately 72 billion dollars.

If this larger sum had been distributed equally, it would have amounted to nearly $2,200 per family. But the national income is never equally divided. If the 72 billion had been distributed in the same proportions as the income that was actually produced, the great majority of American families would still have received less than $1,500, and many would have received far less than this amount. In 1929 with a higher price level the average family income was $2,600, but the great majority of families received less than $1,800, and one-fifth of the families in the country obtained less than $1,000.

Now it is evident that a $1,500 income in 1936 was no more than sufficient to provide the minimum necessities of life. Much more was required to provide what is ordinarily regarded as a "reasonably satisfactory" standard of living; and even this standard is too low to be regarded as the ultimate goal of society.

An increase in the national income can only be achieved through an expansion of the output of goods and services. But we have seen that the depression has seriously damaged our productive machine. Even with the recovery of the past few years industrial production is still 10 per cent below the 1929 level. Meanwhile, the population has grown approximately 5 per cent, which means that our per capita output is approximately 15 per cent below that of 1929.

Before we can regain the 1929 level we must do three things:

1. Make good the actual deterioration of plant and equipment suffered during the depression;

2. Increase productive capital in line with the growth of population; and

3. Expand the production of consumption goods in accordance with the growth of population.

Something of the cost of the depression may be seen in the magnitude of this task. If we are to achieve this goal within five years, it will be necessary for our durable goods industries to turn out approximately 33 billion dollars' worth of goods each year from 1937 to 1941. This is 60 per cent more than the actual production of such goods in 1936, and one-third more than the amount turned out in the boom period of 1925-1929.

If this end were to be attained, what would happen to our unemployed? It is estimated that the durable industries alone would need from eight to nine million more men to fulfill this task. And a considerable increase in consumers goods would also be required to restore the 1929 level of consumption. Thus the near restoration of 1929 standards of production and consumption within five years would more than wipe out our problem of joblessness.

Living Standards and Working Hours

This observation is important because many persons have believed that unemployment could only be eliminated through a general reduction in the working week. They have based this belief on the fact that employment in the manufacturing industries was practically stationary some years before 1929 although production was increasing, and that since 1929 there has been a further increase in the man-hour productivity of labor. Some persons have even taken the position that the United States has arrived at an age of plenty, and that we are threatened with overproduction if we do not reduce working hours.

The danger of emphasizing the shortening of working hours at this time may be readily seen if we consider what would have happened if we had concentrated on this policy at the beginning of the century. Between 1900 and 1929 the per capita production and income of the United States increased about 38 per cent, while the length of the working day in industry was reduced about 13 per cent. If the principle of reducing hours in proportion to increases in industrial efficiency had been followed in 1900, it would have meant that all of the gains of the period would have been realized in the form of increased leisure. There would have been no improvement in living standards. If we accepted this plan today, it would mean that we have to content ourselves indefinitely with a per capita income of $470 per person.

But, the reader may ask, could not this difficulty be overcome if wages were not reduced when the working week was shortened? If more men were given employment and no one suffered a cut in wages, would not the working class as a whole be benefited and consumer buying power increased?

This impression is the result of looking merely at *money incomes.* It is perfectly true that the total wages paid out to labor would be increased by this process. But wages constitute one of the most important items in *costs* for the manufacturer and business man. If his wage bill increases, without a rise in production, a manufacturer is force to boost the price of his goods by a corresponding amount. Since the total industrial output of the country would not and could not be increased by a reduction in hours, it follows that there could be no improvement in living standards by this method. Instead, workers who were now employed would simply be turning over a part of their real income—food, clothing, and other essentials—to the unemployed by giving them part of their jobs. This would make it impossible for the country to devote its energies to increasing production or to raise living standards for the entire population.

The unemployed can be absorbed either through shortening of hours or an increase in output; it is merely a question as to whether the American people as a whole want more leisure or more food, better houses, and greater facilities to use our leisure profitably. In the past we have obtained a little of each. But our analysis of the task of carrying out a program which would restore the 1929 level of production and consumption indicates

that during the next few years longer rather than shorter hours may be required than are now prevailing.

Wages, Prices, and Jobs

The real problem before us is how to stimulate the needed increase of production in order to provide jobs for everyone. Obviously, production will only be increased when business men feel they have a chance of selling more goods. And this depends in turn on the buying power of consumers as a whole.

An expansion in employment will add to the buying power of the workers who were formerly unemployed. Consumer purchasing power is also enlarged when wages increase more rapidly than prices, or when prices decrease when wages are stationary or are declining at a slower rate. Increasing the spread between wages and prices is the only way, in the long run, by which living standards can be raised, and the economic system developed to its full usefulness.

It is important to notice, however, that an increased spread between wage rates and prices such as is necessary to raise buying power depends fundamentally upon raising the efficiency of production. At best, only small increases of wages can be achieved by encroaching on profits. By far the most effective way of raising the wage-price ratio is through increasing the productivity of workers, either through technical advances, improved management, or heightened labor efficiency.

Since 1933, wage rates have been increasing more rapidly than either wholesale prices in the manufacturing industries or the cost of living. Profits, moreover, have also risen more rapidly than commodity prices. This may seem paradoxical, but there are two factors which make it possible for earnings to increase so markedly even though wage rates have risen more rapidly than prices, which has resulted from the retention of the most efficient workers. The first is to be found in the general improvement in productive efficiency in the manufacturing industries. The second, and more important, has been the reduction in unit costs during a period of rapidly increasing output. As a greater proportion of a plant's capacity is used, the overhead tends to be spread over a larger volume of production, thus reducing the costs of each unit.

Until recently the recovery movement had not generated a rapid increase in prices. This is somewhat exceptional and may account, at least in part, for the fact the current recovery, though less intense in character, has continued for a longer period without serious interruption than any other recovery movement in modern times.

Dangers Ahead

In recent months, however, there have been indications that this generally favorable price situation is in danger of giving way to one which is not so satisfactory. In the last quarter of 1936, there was a general upward movement of prices which continued into 1937. The forces behind these increases are very real ones and are perhaps irresistible. In any event, once a general price rise starts the process becomes cumulative. The price of one firm's product soon appears as a cost for other businesses.

This drift in the direction of higher prices is the gravest danger facing the American people today. Whatever the cause, such an increase is a sure road to an inflationary boom with its vicious circle of rising prices, wages, and costs, which in turn necessitate new rises in prices. While this process would doubtless stimulate production for a time, there would certainly be a great increase in industrial unrest, owing to the increased cost of living; and certain groups, such as the farmers, might suffer seriously. It is essential, therefore, that the pressure for higher prices be resisted as much as possible, and that the existing favorable ratio between wages and prices be maintained and improved. As a permanent policy we must go even further and attempt to lower prices in order to increase demand and utilize our productive capacity to the utmost.

Variations within the Price Structure

In general, the disparities between the prices of various products which existed during the depression have been corrected, though exceptions remain. Agricultural and raw material prices which were abnormally low have greatly increased and in some instances may be too high today. Where the latter is true it would seem to be a definite cause for alarm. Efforts should be made to reduce rather than to increase commodity prices at this stage in the economic cycle. It is necessary, in this connection, to make a sharp distinction between conditions existing in the depth of a depression and during the course of a recovery movement. In a depression, a decline in prices may aggravate the crisis by warning consumers that they should wait for even lower prices before they buy. But during the upswing of the economic cycle, a reduction in prices tends to stimulate buying and increase general business.

An example of this tendency may be seen in the automobile industry. In contrast to certain other industries, the automobile manufacturers reduced prices at the beginning of the upturn and increased quality. As a result they have shared in the recovery to a greater extent than most industries, and have enjoyed exceptional profits. The same has been true of the farm machine and fertilizer industries. In contrast, we have the building industry which is still seriously depressed despite the accumulated need for homes and other types of construction. Here the difficulty appears to be due partially to the disorganization of the industry and partially to the excessive demands of labor for high hourly wage *rates*. The result has been much unemployment and very low annual *wages*.

It must be remembered that, fundamentally, wages as well as interest and profits depend on production. Unless men are put to work in the production of useful goods at prices which the public can afford to pay, sustained prosperity is out of the question.

GOVERNMENT CREDIT AND FINANCIAL STABILITY

The attitude of private enterprise toward a possible expansion of activity and employment is closely bound up with the financial and economic status of the Federal Government. Never in the past has a government expended as much as the United States has spent in the past four or five years in an effort to bring about recovery. The result has been a tremendous increase in public indebtedness which has created grave concern regarding the future of our national fiscal policy.

The federal debt rose from a post-war low of $16,026,000,000 on December 31, 1930, to a total of $33,779,000,000 on June 30, 1936. Practically all of this vast increase may be attributed either to efforts to relieve distress and suffering, or to deliberate attempts to promote business revival.

(To be continued in October Issue)

Along the Battle Front (1936-1937)

A Report by Samuel I. Sacks, Chairman Legislative Committee, National Society of Professional Engineers

EDITOR'S NOTE—*After reading Mr. Sacks' report, one is impressed with the fact that wherever professional engineers and vocational engineers sit down together and discuss their respective legislation, a reasonable answer is always found.*

The past year has truly been a struggle along a nation wide battlefront. Successes have not been many but the ground work has been laid for legislation during the next sessions of the national and state legislatures. It is the writer's belief that by the end of this decade there will be universal registration. The accomplishments are set forth below by states. Most legislatures meet during the odd years and hence there is much to report.

Massachusetts: The legislature was in session and an act was drawn but because of the unfortunate illness of several leaders it was not submitted.

Vermont: A joint bill for registering architects and engineers was introduced in the state legislature on March 15 but failed in the house April 10, 1937.

Connecticut: Engineers of Connecticut were successful in preventing the passage of an act to license stationary engine operators. This act would have created much confusion with the professional engineering registration act of that state. It may be said to the credit of the stationary and professional engineers of that state that they are cooperating to present a mutually satisfactory bill at the next session. Although the administration code was opposed by the professional engineers the code passed and provides for the formation of the various licensing boards of that state.

New York: This state has been one of the most active in legislation during the past year. The collapse of the apartment house in the Bronx was the incentive for much legislation. The engineering registration act was amended, making it much stricter in operation.

Three bills sponsored by the engineering profession were enacted into law. All of the bills opposed by the engineering profession were killed in the legislature with one exception and that bill was vetoed by the Governor. One of the most important bills passed requires supervision of construction by either a registered engineer or architect. Another bill amended the engineer registration act so as to restrict practice by non residents for a brief period to legally qualified engineers. In cooperation with operating engineers persons operating or maintaining power plants were exempted.

In passing we note with regret the death of Arnold G. Chapman, past president of the New York State Society of Professional Engineers, who was a most active chairman of the committee on legislation for New York and one of the most cooperative on the national committee.

Pennsylvania: It is often said that a prophet is without honor in his own country. All legislation fostered by the engineers or architects failed of passage; one actually reached the Governor's desk but he vetoed that. A state arbitration act was passed providing for arbitration, on state contracts and requires that one of the three members be a registered civil engineer. The efforts of the engineers to prevent the use of the words "engineer" or "engineering" in the names of firms or corporations who cannot practice engineering has not been successful. The joint efforts of the engineers and architects of this state were also unsuccessful with regard to a permit bill which would prevent any but registered architects or engineers from submitting plans for structures to local or state authorities. However, we were successful in preventing the passage of a stationary engineers license law which would have created much confusion in engineering registration.

Maryland: There was much discussion in Maryland with regard to registration but because of the active opposition of the local chapters of the national societies no act was submitted to the legislature which was in session.

District of Columbia: Bill HR 5683, which is an engineering registration act, is still in the District committee. There is very much opposition beneath the surface and by the power engineers. Congress is still in session but the likelihood of passage is nil.

8-12-37 Just learned that a compromise Bill HR 8084 has been introduced into Congress. Several features should be corrected:—Several exemptions should be eliminated, as also the classifications suggested. Minimum time of experience should be raised from one to four years.

Delaware: Here a bill was introduced which was approved by the committee, approved by the powers that be and by the engineers of Delaware, yet this bill was killed in committee. However the engineers were successful in having the city of Wilmington, which is the largest city in the state, license engineers and permit them to submit plans for buildings the same as architects.

Texas: This state previously had only registered surveyors. After many vicissitudes an engineering registration act which closely follows the model law was repassed and signed by the Governor on May 29, 1937.

Illinois: At present Illinois registers structual engineers only. A bill was submitted which revised this act and which would have provided for the registration of professional engineers. It failed of passage because of strong opposition, particularly of the labor unions, although power engineers were specifically excepted.

Georgia: After a successful campaign by the local committee an engineering registration act was passed March 25, 1937. Those who would sponsor regis-

tration acts in states which do not have such acts would do well to ascertain and follow the methods used by the above committee.

Missouri: A joint architects and engineers registration act was submitted to the legislature. The act closely followed the model law and its passage seemed hopeful yet the bill was killed in committee. Here again had the engineers been properly organized and sufficiently agressive the passage of the act would have been certain.

Ohio: The engineering registration act was amended so as to strenghen several weak points.

Nebraska: On March 25, 1937, which seems to be a fateful day for engineering registration acts, a joint architects and engineers registration act was passed quickly by the new unicameral legislature. The opposition of the operating engineers was avoided by specifically excepting them.

California: At present California registers civil engineers only but is lenient and licenses other engineers under the guise of civil engineers. An act was submitted to the legislature in January but because of the opposition of the power engineers the bill was withdrawn. The engineers of that state plan to organize and submit the bill again to the next legislature of that state.

Iowa: Here, too, the act was amended making the requirements much stricter.

Florida: Florida contemplates revision of its registration act but as far as your committee can ascertain no bill was submitted to the legislature during the past year.

Michigan: Michigan passed a new registration act which closely follows the model law and repeals its act of 1919. The classifications used in the old act were eliminated and Michigan now has a very effective act if enforced.

In closing your committee recommends that the engineers in each state cooperate with operating or power engineers, as they call themselves, so as to eliminate any opposition by the unions and so that proper engine operator licensing acts are passed that do not conflict with professional engineering registration acts.

Again your chairman must complain that he has not obtained the cooperation of the majority of the members of his committee or of the various state officers in keeping him informed as to legislation in each state. However, there have been several outstanding exceptions and these your chairman wishes to thank.

Finally it is suggested that in states where there are no registration acts the engineers organize immediately and make the public and the legislatures registration conscious. An aggressive campaign along the lines adopted in Georgia is certain of success.

Good Counsel

From the April 1937 Issue of Engineering News-Record.

A sane word on educational methods, especially pertinent to current problems of engineering education, comes to notice in an address by Hardy Cross before a section of the Society for the Promotion of Engineering Education last spring, recently published in the Society's journal. Prof. Cross says that it is teaching that counts, not curricula, and that all of the new developments in engineering education would fit quite as well into the curricula of thirty years ago as they do into the more modern ones. The truth of this remark will be recognized by anyone who recalls the splendid work done by our best technical schools thirty and more years ago—the result of sincere, conscientious and inspired teaching more than of highly organized curricula and elaborate equipment. When Prof. Cross says that great buildings and fine laboratories cannot make a great university, but that great teachers do, he gets down to a fundamental principle that engineering colleges will, we hope, never leave out of mind. It is worth remembering, too, that a similar truth applies to the mystic operation of "raising the status of the engineering profession"—its progress depends less on organizing, publicity, bootstrap pulling, than on the personal influence of great engineers.

Note here that these two uses of reason are a search for truth and the attempt to apply that truth to the welfare of humanity. Properly applied no attempt is made to prove anything. Things are so because the evidehce thus far adduced supports them and not because it serves someone's special interest to have them so.

However these uses of reason are somewhat hard on us poor mortals. They are tremendously difficult as an exclusive practice because such uses do not admit of self interest and consequently they are unsound biologically. In other words we must be fed before we can be scientific and it is therefore necessary for us to become familiar with and apply the politician's use of reason where our social and economic welfare are involved.

Ideally, these uses of reason should not be mixed but used side by side, each in its proper place. Of course it is to be hoped that in time scientific reasoning will find its way into the social and political fields, however 5 to 4 decisions by the best legal minds in the country even when conscious self interest has been eliminated indicate that opinion still governs those fields.

Organized professional engineers must, having decided what will benefit their profession, "prove" to the public that those things are right and just and in the public interest. As long as professional engineers remember the fact that no group can prosper long unless the public as a whole prospers, we should govern our demands accordingly. Hence there need be no fear that this use of reason will be unprofessional.

By J. W. DUNHAM,
District of Columbia
Society of Professional Engineers.

THE USES OF REASON TO THE PROFESSIONAL ENGINEER

The present era has been called by optimists the Age of Reason to set it apart from preceding time and mark the rise of Homo Sapiens out of the Cenozoic or Age of Mammals. Like many another common word, reason or its use, reasoning deserves a bit of contemplation to discover its real meaning, and its significance.

The dictionary says that reasoning is the act or process of mind by which from propositions known or assumed new propositions are reached; argumentation; also the reasons, proofs or arguments employed in such process.

It will be seen that reason may be used in various ways depending upon the attitude and purpose of the one using it and it is proposed to consider several ways and what they may mean to the professional engineer.

The scientist observes the phenomena of nature and makes use of reason to correlate his observations in systems of hypotheses, theories and laws.

The applied scientists including the professional engineers starting with the scientist's theories and laws use reason to bridge the gap between the observations and analyses of science and useful prediction, design and construction.

The politician uses reason to prove or attempt to prove that those considerations which are beneficial to the health and livlihood of his particular group are right and just—even holy. He uses all the favorable evidence in support of his propositions and ignores, if the opposition will allow it, the unfavorable evidence. Since the interests of various groups are often at variance, this last use of reason often leads to "proofs" of conflicting propositions which are rather confusing to the scientific mind. The lay mind however is not confused. It swallows one proposition and assumes that the opposition are fools or liars.

The idea is here advanced that each of the above uses of reason is proper and necessary to mankind and that each must be understood and used by all who would deal in human affairs. That includes organizations of professional engineers.

The scientific use of reason is necessary because so far as we can see at present its results are as near as we shall ever come to material truth. The applied scientists' use of reason is necessary because only in that way can the body of scientific "truth" be made to serve humanity.

Aluminum Foil As Insulation

By **W. J. BURKE**

Reynolds Research Corporation, 19 Rector Street, New York City

(*Reprinted from* "THE PENNSYLVANIA ENGINEER")

This paper is especially interesting because of this new field for aluminum. "Architectural Forum" says:

"From Eskimo Pies to Houses is the path of R. S. Reynolds, who has launched a new non-prefabricated house company—R. S. Reynolds is the nephew of the founder of tobacco firm —deserted $100,000 year job 1912 to begin making cigarette wrappings—one of biggest customers was Eskimo Pie Corporation—Reynolds acquired the company—set up building division to sell more foil—discovered selling to building industry more expensive than selling for wrapping cigarettes and eskimo pies—company now manufactures—

1. Fireproof framing and structural flooring.

2. Paper-backed wire lath.

3. Metal foil insulation.

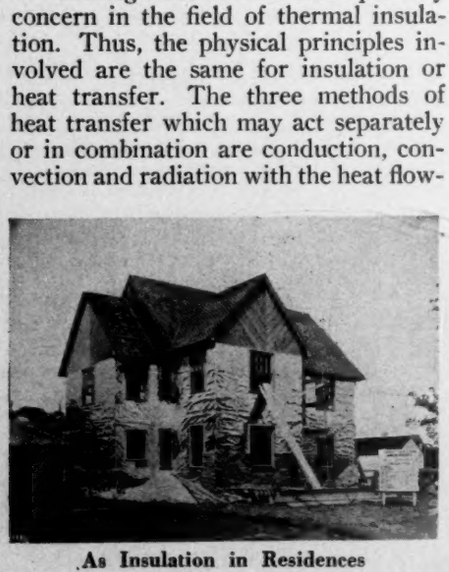
4. Complete heating and air conditioning system.

5. Complete plumbing including fixtures and fittings.

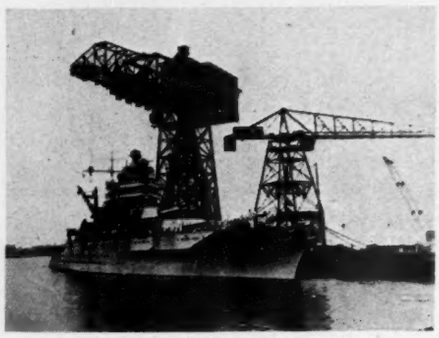
A Reynolds house is to be marketed as "The House with the Silver Lining." "Business Week" states:

"Reynolds Reverses Housing Field" —"financing of homes built under Reynolds plan will be taken care of by Reynolds Corporation when local agencies fall down and the company puts no restrictions on owner, architect or builder other than that regular inspection during construction must show Reynolds specifications are followed."

THE reduction of heat transfer from one region to another is the primary concern in the field of thermal insulation. Thus, the physical principles involved are the same for insulation or heat transfer. The three methods of heat transfer which may act separately or in combination are conduction, convection and radiation with the heat flowing from the higher to the lower temperature region.



As Insulation in Residences



U. S. Battleship Insulated with Aluminum Foil

Although air is a very poor conductor of heat—the conductivity of still air at normal temperature is 0.175 Btu /hr./ sq. ft./ 1° F (1) and the best any insulating material can do is to approach this figure—the insulating value of an ordinary air space is rather small because of the large heat transfer by radiation. Radiation is largely responsible for the ineffectiveness of air spaces bounded by ordinary materials. According to the U. S. Bureau of Standards, (2), from 50% to 80% of the heat transfer across air spaces of ordinary size takes place by radiation. Obviously then, any material which tends to reduce radiation to a minimum should be a good insulating material.

As long ago as 1850, Pechet, a European scientist, investigated the possibilities of using metal surfaces combined with air spaces, as an insulation. More recently, Dr. Ernst Schmidt, continuing along the same lines, substituted thin aluminum sheets for the heavier corroding metals used previously and was successful in developing a new, effective and practical type of insulation.

Air sealed in a narrow space has practically no movement so that very little heat is carried across the space by convection or air movements. If the surfaces bounding this air space are bright polished metallic surfaces, only a small amount of radiant heat will be emitted by the one surface and absorbed by the other. This leaves conduction as the only other possible means of heat transfer and conduction through an air space, as mentioned before, is practically negligible. Thus the result of such a combination is a very good insulator against heat.

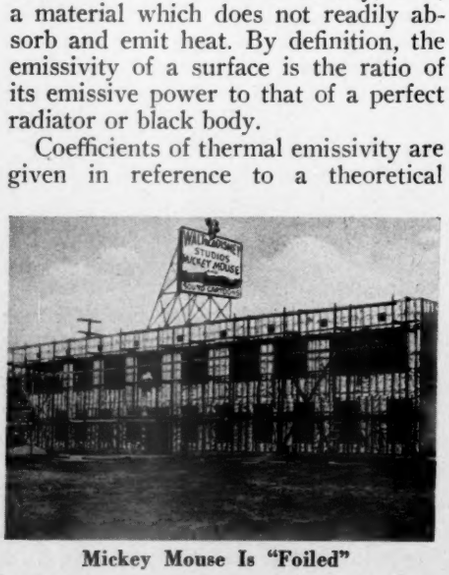
Highly polished aluminum is one of the most reflective surfaces known, and unlike most other bright metallic surfaces retains its reflectivity practically undiminished under normal atmospheric conditions. However, because aluminum has a very high thermal conductivity, for use as an insulating material it is rolled to thicknesses down to ¼ of a thousandth of an inch, thus minimizing the transfer of heat by conduction. In this form it is quite suitable as an insulating material.

Reflective aluminum foil used as insulation must be associated with air spaces. The foil may be installed on one or both sides of an air space or as curtains dividing the air space into any number of separate air spaces. Thus, in some cases an air space may have one side faced with aluminum foil and in other cases both sides my be faced with foil. Aluminum foil is so built up into a section with air spaces then, tends to reduce heat transfer by all three methods—conduction through an air space is poor, little convection takes place in a narrow confined air space, and the polished foil surfaces reflects approximately 95% of the radiant heat striking it.

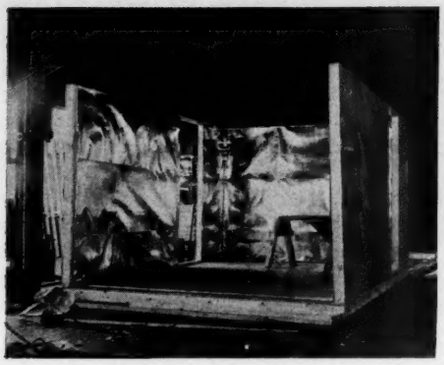
Radiation of heat is similar to the radiation of light. It is projected from the surface of a body through any medium that is transparent to it, such as clear air. When it meets a body that is opaque to it, it is partly absorbed by the opaque body, and the absorbed radiation appears as heat upon the surface of the body.

Radiation may be almost eliminated by confining the air spaces with a material of low thermal emissivity, *i. e.*, a material which does not readily absorb and emit heat. By definition, the emissivity of a surface is the ratio of its emissive power to that of a perfect radiator or black body.

Coefficients of thermal emissivity are given in reference to a theoretical



Mickey Mouse Is "Foiled"



Replica of Byrd's Little America Winter House. Aluminum Foil Insulated

"black" surface which absorbs and emits all of the radiated heat rays striking it. Most common building materials have an emissivity of approximately 95% *i. e.*, all but 5% of the radiant heat striking these surfaces is absorbed. Highly polished aluminum has an emissivity of .04-.06, or 94-96% of the radiant heat striking it is reflected.

Coefficients of Emissivity (3)

"Black"	1.0
Concrete	.97
Brick	.935
Roofing paper	.975
Plaster	.93
Glass	.95
Aluminum paint	.30 -.40
A1-commercial polish	.06 -.25
A1-highly polished	.04 -.06

The deterioration or tarnishing of some aluminum is caused by the impurities or alloys in it. Absolutely pure aluminum does not tarnish. It oxidizes almost immediately on exposure to the atmosphere forming a transparent film of aluminum oxide which prevents further oxidation and which does not appreciably affect its reflectivity. A sample of aluminum exposed for a year and a half on a roof at Columbus, Ohio, was found to have suffered no measurable change in that regard. (4).

Foil rolled from 99.8% pure aluminum is commercially available. A sheet of foil from this commercially available stock has been subjected to a salt spray under pressure for a period of 100 hours. At the end of this test and after the foil had dried, there was no appreciable change in the appearance of the polished surface. The U. S. Bureau of Standards obtained similar results from the 100 hour salt spray test and as a result the War Department is specifying aluminum foil for use as insulation in army posts.

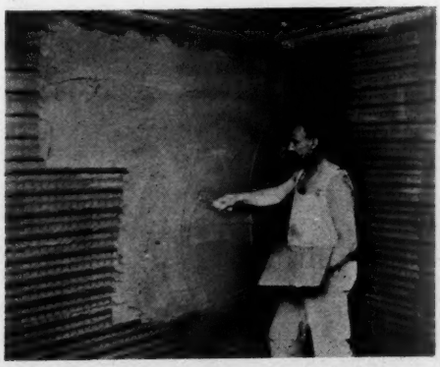
Dampness affects the insulating efficiency of practically all insulating materials. The small pores of cellular insulations make good water retaining receptacles and in the case of most. commonly used insulating materials they absorb and hold water to a greater or lesser degree. The effect of this moisture is to temporarily reduce the insulating efficiency when condensation takes place internally or to promote decay or rot and thus destroy the insulating value of the material.

Any moisture condensation which may occur under exceptionally high humidity and low temperature conditions neither harms the foil nor reduces its overall insulating efficiency. When the moisture drys away it leaves the foil surface bright and shiny. No other type of insulation performs as well under high humidity and low temperature conditions.

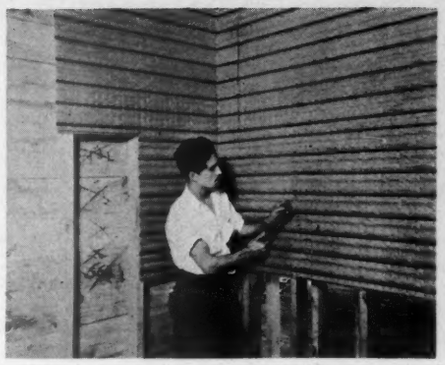
In the thermal insulation of buildings the concern is the reducing of the rate of heat transfer and infiltration by use of insulating materials. The common losses through the walls, floors and roof of a building, due to the transfer of heat through the building materials that separate heated or cooled areas from outdoor temperatures or unconditioned space, can be materially lessened by introducing insulating materials into the structural sections.

The surface resistance of aluminum foil to the flow of heat is greater than for most other building materials. In other words, the difference in temperature between aluminum and the surrounding air is greater than for other materials. The coefficients of surface transfer of heat for common building materials average 1.34-1.65 Btu/Hr./Sq. Ft./° F (3) whereas aluminum averages 0.7 or less.

Aluminum foil may be applied to building materials or other insulation or to modify or subdivide an air space. It is available applied single or double faced to heavy kraft paper and paper backed wire lath known as ecod. In these forms it can be used successfully as insulation in practically all types of building construction and has the advantage of being easily installed by carpenters, roofers, and lathers with no special instructions beyond specifying the lapping of sheets as normally done with building paper or the correct spacing of multiple sheets when applying between framing members to form air spaces.



Applying Plaster to Gage



Applying Foil Insulated Plaster Gage to Two by Fours

When one sheet of foil is used to face an air space single mounted foil may be used. When one or several sheets are used to divide or subdivide an air space double mounted foil may be used in conjunction with a skeleton framework of wood or rigid type insulation or, it may be nailed between studs, joists or rafters. In short, the recommended practice in installing multiple layers of foil, is to keep the separate layers uniformly spaced and free from unnecessary metal to metal contact. The foreign practice of using crumpled foil sheets that are more or less self aligning, is not recommended for building installations. If followed, it requires a reduction in insulating value of 75% of that allowed on multiple sheet to offset the transmission of heat by direct conduction.

The efficiency of foil insulation depends on its exposure to an air space. This means that if the metal surface is touched by a certain amount of contacting members such as lap-siding shingles, flooring, studs or the like, the insulating value will be lowered in proportion to the amount of metal surface so covered. The reason, of course, is that to operate efficiently the surface of the foil, depending upon its reflective or emissive qualities, must be exposed to an air space. When foil is in actual physical contact on both surfaces it forms a good thermal conductor.

The various types of rigid and loose insulation, because of their mass, have for the most part a considerable heat storage capacity which means added expense in cooling a relatively warm insulated chamber or in heating a cold one. With aluminum foil this heat storage capacity is reduced to a minimum.

If the foil faced paper backed wire lath (mentioned above) is used in construction as a plaster or stucco base, the result is one or two sheets of foil insulation automatically installed and facing an air space. This so-called "ecod" is a fabric backed metal reenforcing lath. Polished aluminum foil is asphalted to the back face of the heavy kraft paper fabric. This is formed in wide corrugations through which

are woven galvanized wires spaced 1½" apart. These are welded at 4" intervals to galvanized V-shaped steel ribs set at right angles to the wires.

The following will give some idea as to the insulating effectiveness of foil insulation in a house of standard construction.

1. The wall is made of wood siding (shingles or clap-boards), wood sheathing 25/32" thick, wood studs and the attending air space, metal lath and plaster.
2. This wall is similar to 1 except that one inch of rigid board insulation is used instead of the wood sheathing and one inch of blanket insulation is hung between the studs dividing the air space in two.
3. This wall is also similar to 1 except that two equally spaced sheets of foil divide the air space and the plaster base is foil faced.

The overall coefficients of transmission for these walls are: 1, standard wall, .26; 2, two inches of added insulation, .09; and 3, three sheets of foil added, .10 Btu/sq. ft./Hr./°F. (5).

In the foil insulated wall the foil faced plaster base, such as "ecod" is installed as a unit in the same manner as the metal lath in the other two walls. Thus, the addition of 1" of rigid board insulation plus 1" of blanket type insulation is only 3.8% more efficient than the addition of three sheets of foil insulation.

In the same type of construction, an air space faced on one side with foil is thermally equivalent to .72" of rigid board, .59" of blanket, and .65" of loose fill insulation. In like manner, an air space divided in two with a double faced sheet of foil is equivalent to double the thicknesses just mentioned. And, an air space divided with four layers of double faced foil equally spaced forming five air spaces is equivalent to 3.7" of fibre board, 3" of blanket, and 3.3" of loose insulation.

As mentioned a while back, one of the sources of great heat loss is infiltration of air through the walls of the ordinary building. The usual insulating materials have little windstop value. Infiltration through 1½" of corkboard at 40 lbs. per sq. ft. is 423 cu. ft./hr./sq. ft.; through the average ½" insulation board, 174; and through aluminum foil or kraft paper 0.00. When paper mounted aluminum foil is properly installed it reduces infiltration to zero. However, its insulating value is secondary when the foil surface is in actual contact with any of the building materials such as clapboards, sheathing or the like because physical contact permits heat to be transferred by conduction. Thus, the two uses should be distinguished; primary insulating value requires the exposure of the metal face to an air space, while primary wind and waterproofing value may require that the foil surface be in direct contact with building materials.

One of the large manufacturers of automobiles ran some preliminary tests on aluminum foil insulated cars. Two cars exactly alike as to construction and body finish and color were parked in the open in the sun. One was covered with foil at one-half inch from the car, over the roof, sides and back. The windshield and windows were left uncovered. The car temperatures were read by means of thermometers in three positions—five inches in back of the windshield, over the front seat, and toward the rear of the rear compartment.

The initial average temperature readings were: surrounding air, 61°F.; insulated car air, 62°F.; and uninsulated car, 63°F. At the end of three hours, the average temperatures were: surrounding air, 68°F.; insulated car, 83.1°F.; and uninsulated car, 94.5°F. During this three hour period, the car temperatures were rising and at the end of this period the insulated car was 11.4°F. cooler. From this point on, the car temperatures began to drop until at the end of an additional four hour period, the average temperatures were: surrounding air, 71.2°F.; insulated car, 78.8°F.; and uninsulated car, 82.8°F. —a difference of 4°F. between the two cars.

The thermal conductivities of foil insulating pads suitable for use as refrigerator insulation have been determined with the same 24" hot-plate apparatus that Gregg described in Refrigerating Engineering. (6). However, in this case the tests were conducted with a mean temperature of 75°F. and a temperature drop of 45°F.

The pads were 24" x 24" x 2" made up of either embossed aluminum foil or wraft paper liners with ½" high V-shaped kraft paper spacer ribs mounted to each side of the liners at 3" centers, running in one direction on one side and in the opposite direction on the other side. The liners with a collar of 30 point kraft cylinder board were wrapped with foil mounted kraft paper (foil faced in) or duplex kraft paper and sealed with asphalt.

The thermal conductivity of these pads in Btu/sq. ft./In/°F./Hr ranged from .237 for five sheets of foil and ½" air spaces, to /367 for one sheet of foil, and four of kraft, to .455 for five sheets of kraft. The density was approximately 1.7/cu. ft.

We have set up an apparatus for determining the efficiency of foil pipe covering. Three heating units, two guard coils 6" long at each end of the 24" main coil are wound on an asbestos covered one inch outside diameter pyrex glass tube and inserted into a 44 inch section of standard three inch steam pipe—supported in the center of the pipe by means of two asbestos insulating cylinders one at each end of the 40 inch glass tube, and the whole closed at the ends with standard pipe caps. The leads from these heating coils are brought out through the inside of the glass tube and the center of the pipe caps, connecting each coil in series with a variable resistor and the coils in parallel. The pipe caps and the 3" pipe are well insulated on their exposed outside surfaces at the two ends, leaving an exposed pipe surface three feet long through the middle section of the pipe.

The pipe air temperatures are read by means of thermo-couples and a potentiometer in four places,—one half inch above and three inches in from each end of the main heater, and one half inch above and at the middle of the two guard heaters. This is done so that the guard and main heaters can be balanced—causing all the heat loss from the main heater to flow radially through the two foot test section of the pipe. The pipe temperature is read by means of twelve thermocouples—four each at 90°, at the middle and 10" to the right and left of the middle of the two foot test section. These twelve couples are each peened into a small hole 1/16" deep.

The pipe covering to be tested is applied in a three foot length and the power applied. When the heaters are balanced, the apparatus is allowed to set for sixteen hours. Then readings are recorded over an eight hour period, and checked after another lapse of sixteen hours.

Following are some results obtained on this apparatus at an average pipe temperature of 301°F. and a temperature drop from pipe to room of 227°F.

	Heat Loss Btu/sq. ft./Hr./°F.	Efficiency %
85% Magnesia	.486	83.1
Asbestos Air Cell	.647	77.5
Double Faced Aluminum Foil	.590	79.5
Double Faced Aluminum Foil	.568	80.3

This places this particular type of foil covering between Magnesia and Air Cell on a thermal efficiency basis.

In conclusion, then—some of the advantages of aluminum foil insulation are:

1. Very low thermal conductivity—K = .22 Btu/Sq Ft/In/°F/Hr. (4)
2. Very low density—approximately 1/10 that of fibre board insulations
3. Negligibly small heat storage capacity
4. Relatively small storage space

5. Low in cost
6. Easily installed—clean and free from dust during application
7. Non-deteriorating—the oxide film protects the polished surface and does not materially affect the emissivity
8. Non-absorptive—may be quickly dried out and restored even after submersion in water
9. Durability—proof against destruction by fungi, termites and vermin
10. Odorless
11. Fire retarding
12. Wind and waterproof

REFERENCES

(1) A.S.R.E. Refrigerating Data Book 1932-33

(2) U. S. Bureau of Standards Circular, No. 376

(3) Callender, J. H., Architectural Forum, Jan., 1934

(4) Gregg, J. L., Product Engineering, May, 1932

(5) American Architect—"Thermal Insulation of Buildings" May, 1934

(6) Gregg, J. L. Refrigerating Engineer, May, 1932

INDUSTRIAL SITE SELECTION INVOLVES COMMUNITY OBLIGATIONS, SAYS SEC'Y ROPER

Factory sites should be chosen purely on the basis of lasting natural and economic advantages rather than on temporary inducements, according to U. S. Secretary of Commerce, Daniel C. Roper. Secretary Roper's statement heads a symposium by leading authorities on the subject of industrial site-planning factors that is published in the August issue of *Architectural Record.*

"Whether locally- or foreign-owned," says Secretary Roper, "the enterprise needs to recognize definite obligations to the community. Thus, the necessary good will of the community and safeguard for the future will be conserved. It is, of course, desirable that the factory buildings and associated structures be of high standard in appearance. Modern architectural treatment of factory buildings and landscaping therewith should not only recognize attractiveness but depict as well the dignity and strength of the industry. Attention to these details will awaken community pride in the factory and thus promote safe business. Employes will be proud of it and their loyalty increased. Furthermore, the market value of neighboring property will be enhanced. The factory will thus make its place in the community and prove to be a good neighbor."

M. Ada Beney, of the National Industrial Conference Board, discussing labor considerations in factory location, points out that apparent advantages of low wage scales may be only temporary, and urges that the community's facilities for recreation, education and health be seriously considered, since lack of such public facilities may throw the burden upon the manufacturer.

Questions of proximity to raw materials are discussed by S. D. Kirkpatrick, editor of *Chemical and Metallurgical Engineering;* proximity to fuel and power by Russel L. McBride, consulting engineer; and waste disposal factors by Charles P. Wood, of Lockwood Greene Engineers, Inc. Mr. Wood is of the opinion that America is still behind Europe in solving waste disposal problems, and that Americans should give more attention to waste disposal as a factor in selection of sites for manufacturing plants.

CONSTRUCTION STATISTICS

With the July record, once again construction has established a new high level for the recovery. According to figures of F. W. Dodge Corporation, the July total for all classes of construction amounted to $321,602,700 in the 37 eastern states, topping the previous high figure of the recovery reported in June of this year in the amount of $317,842,100 and representing an increase of 8 per cent over the total of $294,734,500 reported in July, 1936.

Of the July 1937 volume, $81,046,000 was for residential building, $138,063,500 for non-residential building, and $102,493,200 for civil engineering projects, i. e., public works and public utilities. The residential total compares with $71,993,700 for July 1936 and $93,078,100 for June of this year. The July 1937 non-residential total was about 44 per cent greater than the total for July of last year and exceeded the June 1937 total of $124,837,000 by about 10 per cent. Civil engineering projects started in July fell materially below the figure of $126,615,600 shown for a year ago and were only little better than the total of $99,927,000 shown for June of this year.

For the first seven months of 1937 the total volume of construction undertaken in the 37 Eastern States reached $1,815,253,900; this was an increase of 19 per cent over the total of $1,532,075,300 for the corresponding seven months of last year. Of the 1937 cumulative volume residential building amounted to $597,452,500; for the corresponding period of 1936 residential building totaled $406,838,300.

Famine in China

From the Editorial Page of the Bridgeport (Conn.) Telegram.

China is in the midst of a periodical famine. From Hankow comes a terrible story. Chinese "junks" carrying rice down the river were waylaid and attacked by 800 hunger-crazed farmers whose crops had failed. Soldiers aboard the rice boats fired and killed the attackers, who then overran the neighboring countryside, chopped down trees, ate the leaves, and sold the wood for firewood.

More than two million persons are said to be in a starving condition, in the area west of the Hankow-Peiping railroad. More than 6,500 have died there of starvation since March 1.

China is a good example of a country where natural resources have been depleted to destruction. The forests were cut down centuries ago without any attempt at reforestation. Floods and soil erosion followed. Despite the efforts of the Chinese at intensive cultivation, including the dangerous use of human fertilizer, the depletion of the soil has gone on. Floods have grown worse, more top soil has been washed away, droughts have followed.

It is a far cry from our "fat" land to lean China. Yet China was once as rich and fertile as is the United States today. The same blindness, the same indifference toward the future which led to destruction there, could lead to destruction here. Natural resources are not permanent and everlasting. They must be husbanded. We are only beginning to learn the lesson in our own country.

MECHANICAL ENGINEERS WILL ELECT THIS FALL

Nominations for Officers of The American Society of Mechanical Engineers for 1938 were announced at a recent meeting of the Nominating Committee held at Detroit, Mich., during the Semi-Annual Meeting. Election will be held by letter ballot of the entire membership, closing on September 28, 1937.

The nominees as presented by the Regular Nominating Committee of the Society are:

President

H. N. Davis, President,
Stevens Inst. of Technology,
Hoboken, N. J.

Vice-Presidents

(To serve 1 year)

F. O. Hoagland, Master Mechanic,
Pratt & Whitney Division,
Niles Bement-Pond Co.,
436 Capitol Ave.,
Hartford, Conn.

(To serve 2 years)

B. M. Brigman, Dean,
Speed Scientific School,
University of Louisville,
Louisville, Ky.

Harte Cooke, Mechanical Engineer,
McIntosh & Seymour Corp.,
100 Orchard St.,
Auburn, N. Y.

W. H. McBryde, Cons. Engineer,
1111 Financial Center Bldg.,
San Francisco, Calif.

L. W. Wallace, Director,
Equipment Research,
Association of Am. Railroads,
59 East Van Buren St.,
Chicago, Ill.

Managers

(To serve 3 years)

Carl Bausch, Vice-President,
Bausch & Lomb Optical Co.,
635 St. Paul St.,
Rochester, N. Y.

S. B. Earle, Dean
School of Engineering,
Clemson A. & M. College,
Clemson College, S. C.

F. H. Prouty, Partner
Prouty Brothers Engrg. Co.,
Exchange Bldg.,
Denver, Colo.

Security of Employment in the Engineering Profession[1]

[From the Monthly Labor Review (May 1937) of the Bureau of Labor Statistics, United States Department of Labor]

Prior to the onset of the depression in 1929, only nonprofessional workers were primarily concerned with the stability and security of employment. The effects of the depression years, however, were such as to bring about a quickening of interest in the subject of economic security even among professional workers. Because of this, a series of questions relating to this subject was incorporated in the Bureau's study of the engineering profession. Data were requested concerning the employment and separation contract, pension privileges, and the medium used to obtain a position; also whether or not the engineer reporting was under civil service, and what his status was with regard to patent rights.

The present article[2] is based upon data supplied by 35,559 engineers who reported the field of engineering engaged in and who had an engineering job in December 1934.[3] Their reports indicate that 68.4 percent of all professional engineers used personal contacts and recommendations to obtain their jobs. Those who used this medium, together with those who obtained their positions through the civil service, formed nearly four-fifths of all reporting.

The degree of economic security among professional engineers, as evidenced by possession of an employment contract covering some period of time, or by pension privileges, was negligible.

In general, there appears to be little restriction upon professional engineers with regard to patent rights to inventions made by them. The extent of restriction, however, depended largely upon the engineer's field of employment and the type of work in which engaged.

Means Used to Obtain Employment

The data furnished by engineers concerning the medium through which they obtained employment are presented in table 1.

These figures demonstrate that for the engineering profession as a whole, placement was not the function of any particular organization. The vast majority of professional engineers obtained their jobs through personal contacts and recommendations. This was the means used to find the position held in 1934 by no less than 68.4 percent of the 35,559 engineers who also reported the field of engineering activity in which they were engaged. This medium of employment was reported by three-quarters of the chemical, electrical, and mining and metallurgical engineers, and by slightly more than 70.0 percent of the mechanical and industrial engineers, but by only 61.7 percent of the civil engineers. The civil engineers, however, found more positions through civil service agencies; in fact, 2,941, or 80.0 percent, of the 3,706 engineers who were classified under this medium, were civil engineers. This is further emphasized by a consideration of the data for the five professional classes. Of the engineers who had engineering jobs in December 1934, 19.8 percent of the civil engineers stated that these were found through the civil service, whereas among the remaining four professional classes, the range was from only 2.5 percent for the chemical and ceramic engineers to 4.6 percent for the mining and metallurgical engineers.

It will, however, be noted that personal contacts and recommendations, together with civil service, accounted for 74.2 percent of the mechanical and industrial engineers. For each of the remaining professional classes, these two mediums covered approximately four-fifths of their respective totals, ranging from 78.4 percent of the chemical and ceramic to 81.5 percent of the civil engineers. Mechanical and industrial engineers reported relatively higher percentages of jobs obtained through an engineering society, a private employment agency, and newspapers. The most significant differences, however, will be noted for "medium not reported" and "any other medium." Thus, only in the case of civil, and mining and metallurgical, engineers did "any other medium" embrace smaller proportions than those classified under "medium not reported." For the other three professional classes, this condition was reversed. "Any other medium" may well include a substantial number placed through their colleges, a point not covered in the questionnaire and one likely to affect the percentage noted in this classification.

Although the percentage distributions for the remaining avenues to employment do not embrace large numbers of each professional class, relatively they do present some striking contrasts. Only 2.4 percent of all engineers reported that they obtained their position through an engineering society. Some 3.7 and 2.7 percent respectively of the mechanical and industrial, and mining and metallurgical engineers were so classified. For the three remaining professional classes, the percentages ranged from 1.4 to 1.9. Despite the fact that so few engineers reported an engineering society as their employment medium, it must be recognized that such societies are an important factor in obtaining employment for professional engineers. It is obvious that through their members there must inevitably be a pooling of information on employment prospects, both locally and nationally. Furthermore, the officials of the various societies are kept in close touch with local and national employment conditions as a result of their meetings and conventions; but such appointments as are made would depend rather upon personal contacts and recommendations than upon contacts made through the society's employment service. The fact, therefore, that only 2.4 percent of all engineers reported the engineering society as their medium of employment must be interpreted in the light of these conditions.

The securing of employment through newspapers and technical journals was reported by 1.6 and 1.0 percent, respectively, of all engineers

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[1] Prepared by Andrew Fraser, Jr., of the Bureau's Division of Wages, Hours, and Working Conditions.

[2] This is fourth of a series of summary articles covering the results of the study. The previous articles were carried in the Monthly Labor Review for June 1936 and January and April 1937.

[3] The numbers reported in this article as engaged in engineering work in December 1934 cannot be compared with those shown in the discussion of employment. The former were derived from all of the 35,890 engineers who reported the field of engineering in which they were engaged. The discussion of employment dealt with all those older engineers who reported in the 3 years 1929, 1932, and 1934, and all 1930-32 engineers who reported in 1932 and 1934. The grand total, including the 1933-34 engineers, was 35,675.

Of the 35,890 engineers who gave income data in their special field, 331 did not report the year of their birth. Hence, 35,559 constitutes the base for all subsequent relationships with field of engineering engaged in. But 1,458 of these engineers did not report as to type of work engaged in, and hence 34,101 was used as a base figure for all subsequent relationships with functional classification.

Table 1.—Distribution of All Engineers Reporting Medium of Obtaining Employment, by Professional Class, at End of 1934

Medium used to obtain employment	Engineers utilizing each specified medium					
	All professional classes	Chemical and ceramic engineers	Civil, agricultural, and architectural engineers	Electrical engineers	Mechanical and industrial engineers	Mining and metallurgical engineers
	Number					
All mediums	35,559	2,538	14,861	6,816	9,833	1,511
Personal contacts and recommendations	24,312	1,927	9,179	5,106	6,960	1,140
Civil service	3,706	63	2,941	289	343	70
Engineering society	841	36	274	130	360	41
Private employment agency	576	49	113	112	285	17
Newspapers	567	27	152	120	255	13
Technical journals	363	54	142	64	85	18
United States Employment or Reemployment Service	264	7	190	14	46	7
Other public employment service	268	15	169	26	54	4
Any other medium	2,551	259	706	655	849	82
Medium not reported	2,111	101	995	300	596	119
	Percent					
All mediums	100.0	100.0	100.0	100.0	100.0	100.0
Personal contacts and recommendations	68.4	75.9	61.7	75.0	70.7	75.4
Civil service	10.4	2.5	19.8	4.2	3.5	4.6
Engineering society	2.4	1.4	1.8	1.9	3.7	2.7
Private employment agency	1.6	1.9	.8	1.6	2.9	1.1
Newspapers	1.6	1.1	1.0	1.8	2.6	.9
Technical journals	1.0	2.1	1.0	.9	.9	1.2
United States Employment or Reemployment Service	.7	.3	1.3	.2	.5	.5
Other public employment service	.8	.6	1.1	.4	.5	.3
Any other medium	7.2	10.2	4.8	9.6	8.6	5.4
Medium not reported	5.9	4.0	6.7	4.4	6.1	7.9

making returns. It will be noted however that, relatively, electrical and mechanical and industrial engineers found more jobs through newspapers than did any of the other professional classes; this medium was reported by 1.8 percent of the electrical and 2.6 percent of the mechanical and industrial engineers, whereas among the other classes the highest percentage was 1.1. On the other hand, technical journals as a medium of employment were of more assistance to chemical and ceramic engineers (2.1 percent); among the remaining professional classes percentages ranged from 0.9 to 1.2.

Private employment agencies were used by only 1.6 percent of all engineers reported. When considered together, the two public employment agencies embraced approximately the same proportion, namely, 1.5 percent. A similar comparison among the five professional classes showed that, relatively, public agencies were of more importance to civil engineers, of whom 2.4 percent so reported, whereas the next highest percentage was 1.0 percent for mechanical and industrial engineers. Only 0.8 percent of the civil engineers used private employment agencies to obtain jobs, but 2.9 percent of the mechanical and industrial engineers did so; for the remaining professional classes, the percentages ranged from 1.1 to 1.9 percent.

Economic Security in the Engineering Profession

A written contract of employment and pension privileges are two important criteria of economic security. The efficacy of any such schemes, however, depends to a marked extent upon the nature of the employment. This is demonstrated by a comparison of the data concerning economic security among professional engineers who reported as being engaged in public engineering, personal service, and private engineering.

Civil-service status.—The importance of civil-service status as a factor in stability of employment is shown in table 2.

Despite the fact that in all 11,177 of the engineers reporting were in the employ of public authorities in December 1934, only 45.0 percent of them reported as being under civil service. The proportion of all engineers with civil-service status was 48.4 percent in the case of positions under the Federal Government, and for employment under State and county, and municipal governments, 36.1 and 45.6 percent, respectively. This percentage under civil service of these engineers employed by the Federal Government was higher than in the two other public employments, despite the enormous increase in Federal Government employment by December 1934, because of the amount of temporary employment under the work-relief programs; it may be assumed that relatively few of the engineers so employed would be classified under civil service. Consequently, under normal circumstances, the proportion of all engineers under civil service with the Federal Government would be higher than 48.4 percent. On the other hand, with regard to the other two classes of public engineering, it will be recalled that the numbers of engineers so engaged remained comparatively stable over the period 1930-34. Hence, the proportions reported as being under civil service are representative of the situation.

The relative proportions of each professional class under civil service

Table 2.—Distribution of All Engineers Reporting as to Civil-Service Status, by Field of Employment and Professional Class, at End of 1934

Field of employment and professional class	Number				Percent			
	Total	Without status	With status	Not reporting	Total	Without status	With status	Not reporting
Federal Government	4,649	2,084	2,250	315	100.0	44.8	48.4	6.8
Chemical and ceramic	74	22	44	8	100.0	29.7	59.5	10.8
Civil, agricultural, and architectural	3,620	1,649	1,734	237	100.0	45.6	47.9	6.5
Electrical	306	143	138	25	100.0	46.7	45.1	8.2
Mechanical and industrial	549	240	272	37	100.0	43.7	49.6	6.7
Mining and metallurgical	100	30	62	8	100.0	30.0	62.0	8.0
State and county governments	4,438	2,487	1,604	347	100.0	56.1	36.1	7.8
Chemical and ceramic	37	30	3	4	100.0	81.1	8.1	10.8
Civil, agricultural, and architectural	4,044	2,203	1,535	306	100.0	54.4	38.0	7.6
Electrical	134	91	33	10	100.0	67.9	24.6	7.5
Mechanical and industrial	170	123	28	19	100.0	72.3	16.5	11.2
Mining and metallurgical	53	40	5	8	100.0	75.5	9.4	15.1
Municipal governments	2,090	1,028	952	110	100.0	49.1	45.6	5.3
Chemical and ceramic	54	28	23	3	100.0	51.8	42.6	5.6
Civil, agricultural, and architectural	1,617	829	709	79	100.0	51.3	43.8	4.9
Electrical	238	88	136	14	100.0	37.0	57.1	5.9
Mechanical and industrial	158	70	77	11	100.0	44.3	48.7	7.0
Mining and metallurgical	23	13	7	3	100.0	56.6	30.4	13.0

differed very markedly among the three classes of public engineering employment. The smallest range occurred in Federal positions—from 45.1 percent for electrical engineers to 62.0 percent for mining and metallurgical engineers. These two professional classes also constituted the extremes of the range of the proportions embraced by municipal governments, but in reverse order. Thus, of the mining and metallurgical engineers in municipal employment 30.4 percent, and of the electrical engineers 57.1 percent, had civil service status. Relatively, the smallest numbers of each professional class under civil service were found in State and county governments. This is best exemplified by the comparative data for civil engineers; of their number, 47.9 and 43.8 percent respectively, in Federal and municipal employments, but only 38.0 percent in State and county positions, had civil-service status. But since the civil engineers comprised approximately 80.0 percent of the 5,038 engineers who were under civil service, it is obvious that such a status is a significant contributory factor to the stability of employment.

The employment contract.—For the engineering profession as a whole, the data in table 3 clearly evidence a lack of economic security in terms of a written contract which would secure employment over a substantial period of time. In all, only 3,169, or 8.9 percent, of the 35,559 engineers who reported employment in an engineering field[4] were covered by written contract. Of these, some 0.8 percent had a contract for less than 1 year, 3.5 percent a contract for between 1 and 2 years, and only 0.9 percent for 2 years or more. Engineers who did not report as to period of contract formed 3.7 percent of the whole. No less than 91.1 percent either answered "No" or did not furnish specific information.

Comparison of the positive returns on employment contract from all engineers in the three broad fields of engineering employment shows that use of the contract was most common in personal service—primarily education.

For engineers under contract in the personal service field the most common contract period (reported by 25.6 percent of the 2,778 engineers so engaged) was from 1 to 2 years. Some 4.0 percent were under contract for periods of 2 years or longer. Although the corresponding percentages for public engineering were much lower than for personal service, they were higher than for private engineering. For employment contracts under 1 year, however, private exceeded public engineering (1.0 percent, as against 0.5 percent). Of all reporting engineers engaged in public engineering, 2.0 percent had contracts for 1 and under 2 years, and 1.1 percent for periods of 2 years and over. The corresponding percentages for private engineering were 1.4 and 0.5 percent.

For the separate fields of employment under private engineering, relatively the largest proportion of engineers under contract in their jobs occurred in manufacturing, with 408, or 3.8 percent of the 10,888, reporting as so engaged. In the construction and extractive industries 3.0 and 2.0 percent, respectively, had written contracts. The smallest proportions under contract were reported by engineers in the employ of public utilities or engaged in transportation (1.1 and 0.9 percent, respectively). There was a marked contrast in contract status between Federal positions and those in the two other categories of public engineering. Thus, while only 2.3 percent of the 4,649 reporting engineers in Federal employ were on contract, the proportion working on this basis for State and county and for municipal governments formed respectively 4.2 and 4.7 percent of their grand totals.

The type of work in which engineers under contract were engaged is presented in table 4.

In general, the distribution followed the same trend as shown in table 3, that is to say, the largest groups had written contracts for periods from 1 and under 2 years. Table 4 also confirms the previous finding that engineers engaged in teaching are relatively more secure with regard to employment than other members of the engineering profession: 33.8 percent of their number reported written contracts for periods of from 1 to 2 years. Sales employments, next in order, had under contract for a similar period only 3.9 percent of their 1,513 reporting engineers, and general administration and management only 2.3 percent. Each of the other types of work had less than 2.0 percent. Even for the contract periods of 2 years and over, teaching covered 4.8 percent of the total reported for this type of work. The next highest percentage, namely, 1.5, was reported for general administration and management. In no one of the remaining employments did the percentage of engineers with written contracts for 2 years and over exceed 0.8 percent.

Thus, with regard to fields of employment or the types of work within them, the engineering profession cannot be said to have any substantial security of employment provided through a written contract for a period of time. On the other hand, professional engineers are not generally restricted with regard to the seeking of employment similar to that in which they may be engaged. This is evidenced by a consideration of the data furnished by professional engineers concerning their separation contract status (tables 5 and 6).

Only 1.4 percent of all the reporting engineers stated that they were under a contract for a definite period of time during which they bound themselves not to seek similar employment.

[4] Throughout the whole of this discussion, only engineering employment is considered. Consequently, no cognizance has been taken of the economic security of engineers engaged in nonengineering employment.

Table 3.—Distribution of All Engineers Reporting Employment Contract, by Field of Employment, at End of 1934

Field of employment	Number						Percent					
		Under contract for—			Under contract, no period reported	Not reporting [1]		Under contract for—			Under contract, no period reported	Not reporting [1]
	Total	Under 1 year	1 and under 2 years	2 years and over			Total	Under 1 year	1 and under 2 years	2 years and over		
All fields	35,559	295	1,234	330	1,310	32,390	100.0	0.8	3.5	0.9	3.7	91.1
Private engineering	21,604	212	298	99	637	20,358	100.0	1.0	1.4	.5	2.9	94.2
Construction	3,437	32	63	12	113	3,217	100.0	.9	1.8	.3	3.3	93.7
Extractive industries	1,841	11	21	6	60	1,743	100.0	.6	1.1	.3	3.3	94.7
Public utilities	4,183	16	21	8	50	4,088	100.0	.4	.5	.2	1.2	97.7
Transportation	1,255	5	4	2	17	1,227	100.0	.4	.3	.2	1.4	97.7
Manufacturing	10,888	148	189	71	397	10,083	100.0	1.4	1.7	.7	3.6	92.6
Public engineering	11,177	53	224	121	295	10,484	100.0	.5	2.0	1.1	2.6	93.8
Federal Government	4,649	33	42	34	181	4,359	100.0	.7	.9	.7	3.9	93.8
State and county governments	4,438	15	125	50	81	4,167	100.0	.3	2.8	1.1	1.8	94.0
Municipal governments	2,090	5	57	37	33	1,958	100.0	.2	2.7	1.8	1.6	93.7
Personal service	2,778	30	712	110	378	1,548	100.0	1.1	25.6	4.0	13.6	55.7

[1] Also includes those who reported "No", which number could not be separated in the tabulation.

Table 4.—Distribution of All Engineers Reporting Employment Contract, by Type of Work Engaged in, at End of 1934

Type of work	Number						Percent					
		Under contract for—			Under contract, no period reported	Not reporting [1]		Under contract for—			Under contract, no period reported	Not reporting [1]
	Total	Under 1 year	1 and under 2 years	2 years and over			Total	Under 1 year	1 and under 2 years	2 years and over		
All types	34,101	288	1,196	311	1,236	31,070	100.0	0.8	3.5	0.9	3 6	91.2
Design and research	9,050	106	119	52	305	8,468	100.0	1.2	1.3	.6	3.4	93.5
Construction	8,233	39	153	63	209	7,769	100.0	.5	1.9	.8	2.5	94 3
Operation	8,276	57	79	38	148	7,954	100.0	.7	1.0	.5	1.8	96 0
Consulting	2,146	26	30	11	80	1,999	100.0	1.2	1.4	.5	3.7	93 2
Teaching	2,050	24	692	98	350	886	100.0	1.2	33.8	4.8	17.1	43.1
Sales	1,513	15	59	7	56	1,376	100.0	1.0	3.9	.5	3.7	90.9
General administration and management	2,833	21	64	42	88	2,618	100.0	.7	2.3	1.5	3.1	92.4

[1] Also includes those who reported "No", which number could not be separated in the tabulation.

Table 5.—Distribution of All Engineers, Reporting Separation Contract, by Field of Employment, at End of 1934

Field of employment	Number						Percent					
		Under contract for—			Under contract, no period reported	Not reporting [1]		Under contract for—			Under contract, no period reported	Not reporting [1]
	Total	Under 1 year	1 and under 2 years	2 years and over			Total	Under 1 year	1 and under 2 years	2 years and over		
All employments	35,559	287	77	128	95	34,972	100.0	0.8	0.2	0.4	0.3	98.3
Private engineering	21,604	180	67	124	38	21,195	100.0	.8	.3	.6	.2	98.1
Construction	3,437	32	5	8	10	3,382	100.0	.9	.1	.2	3.	98.5
Extractive industries	1,841	19	1	2	4	1,815	100.0	1.0	.1	.1	.2	98.6
Public utilities	4,183	16	2	2	4	4,159	100.0	.4	(2)	(2)	.1	99.5
Transportation	1,255	2	------	------	2	1,251	100.0	.2	------	------	.2	99.6
Manufacturing	10,888	111	59	112	18	10,588	100.0	1.0	.5	1.0	.2	97.3
Public engineering	11,177	50	3	2	26	11,096	100.0	.4	(2)	(2)	.2	99.4
Federal Government	4,649	16	1	2	8	4,622	100.0	.3	(2)	(2)	.2	99.5
State and county governments	4,438	27	1	------	10	4,400	100.0	.6	(2)	------	.2	99.2
Municipal governments	2,090	7	1	------	8	2,074	100.0	.3	(2)	------	.4	99.3
Personal service	2,778	57	7	2	31	2,681	100.0	2.1	.3	.1	1.1	96 4

[1] Also includes those who reported "No", which number could not be separated in the tabulation.
[2] Less than 1/10 of 1 percent.

Table 6.—Distribution of All Engineers Reporting Separation Contract, by Type of Work Engaged in, at End of 1934

Type of work	Number						Percent					
		Under contract for—			Under contract, no period reported	Not reporting [1]		Under contract for—			Under contract, no period reported	Not reporting [1]
	Total	Under 1 year	1 and under 2 years	2 years and over			Total	Under 1 year	1 and under 2 years	2 years and over		
All types	34,101	274	72	122	93	33,540	100.0	0.8	0.2	0.4	0.3	98.3
Design and research	9,050	68	33	62	15	8,872	100.0	.8	.4	.7	.2	97.9
Construction	8,233	45	9	2	18	8,159	100.0	.5	.1	(2)	.2	99.2
Operation	8,276	52	12	33	16	8,163	100.0	.6	.1	.4	.2	98.7
Consulting	2,146	10	------	9	8	2,119	100.0	.5	------	.4	.4	98.7
Teaching	2,050	51	6	------	31	1,962	100.0	2.5	.3	------	1.5	95.7
Sales	1,513	28	6	5	1	1,473	100.0	1.9	.4	.3	.1	97.3
General administration and and management	2,833	20	6	11	4	2,792	100.0	.7	.2	.4	.1	98.6

[1] Also includes those who reported "No", which number could not be separated in the tabulation
[2] Less than 1/10 of 1 percent.

This included 0.8 percent whose separation contracts were for less than 1 year, 0.2 percent for a period of from 1 to 2 years, and 0.4 percent for 2 years and over. Clearly, restrictions upon professional engineers with regard to new employment were few.

It will, however, be noted in table 5 that 2.1 percent of the reporting engineers in personal service were under separation contracts for less than 1 year, whereas the proportion in extractive industries and manufacturing was 1.0 percent each. The reason for the relatively greater use of the separation contract in personal service is not clear. In the case of extractive industries and manufacturing, the use of secret processes probably makes necessary some protection for the employer. It is, however, very evident that even for these fields such a contract is seldom required. This freedom from restriction with regard to other employment is also apparent from table 6. Only two types of work —teaching and sales—covered more than 1.0 percent of their respective totals, and in neither case did the period of contract exceed 1 year. In the teaching profession 2.5 percent of the engineers were under separation contract and in sales 1.9 percent; none of the other groups exceeded 0.8 percent. Notwithstanding, it is significant that some 0.7 percent of the engineers engaged in design and research were under separation contract for periods for 2 years and over.

Provision for retirement on pension. —An analysis of the data furnished by professional engineers concerning their pension privileges is presented in table 7.

As of December 1934 almost one-third (10,641) of the 35,559 professional engineers reporting who had engineering jobs at that time stated that they had pension privileges. Of this number, 6,684, or 18.8 percent, were covered by contributory pension schemes, and 3,957, or 11.1 percent by noncontributory schemes. Some 57.8 percent were in employments for which no pension provision had been made. About 12.3 percent did not furnish information.

Of the engineers in pensionable positions, the smallest relative proportion, 26.2 percent, were engaged in private engineering. By contrast, 37.4 percent of the engineers engaged in public engineering and 29.0 percent of those in personal service had pension privileges. It will also be noted that for public engineering and personal service the contributory scheme predominated. On the other hand, of the

(Continued in the October Issue)

NEWS OF STATE SOCIETIES

"THE SUMMER SOLSTICE"

INDIANA

I. S. P. E. NEWS LETTER

Issued by the Indiana Society of Professional Engineers, Inc.

Editor's Note: Two meetings of the Society have been held since the publication of the first news letter. Since the meetings of June 18th and July 9th were but three weeks apart, items of interest from both meetings are condensed in this issue of the news letter.

LABOR ORGANIZATIONS DISCUSSED

At the June 18th meeting of the Society, a great portion of the meeting was devoted to a discussion of the relation of the professional engineer to labor organizations. An outgrowth of the Wagner Labor Act, the recent organization activities of the laber unions have forced the professional man to take an interest in labor questions in which he formerly evinced little, if any, interest.

Engineer C. A. Broecker discussed at length the activities of the union organizations in localities where engineers were affected, and he compared the organization structure of the so-called vertical unions such as those of the C. I. O. with the horizontal unions of the A. F. of L. Various members spoke briefly on the labor question as it affected men in the professions and voiced the opinion that the professional man should not be forced to align himself with one of the unions. Since this seemed to be the general sentiment of the members. it was voted to send a telegram to the National Directors of the Society, informing them that our Society was heartily in accord with their efforts to have the professional engineers excluded from the provisions of the Wagner Labor Act. The telegram was sent by our national director, Earl Carter, so that it would reach the Board of Directors before their meeting in Washington on the morning of June 19th,

COMMITTEE INVITES SUGGESTIONS

Chairman J. T. Hallett of the committee on Ethics and Practice at the July 9th meeting invited suggestions from the members to aid the committee in preparing a code of ethics for engineers. The committee has a lot of work ahead of it in preparing this code and it is the aim of the committee to make it as complete as possible.

Pres. S. G. Cohen emphasized the importance of such a code, and cited the code adopted by the Ohio Society which has not only been adopted by the practicing engineers but by the State Board of Registration as a basis for enforcement. At the present time it is impossible to support a charge of unethical practice against a registered engineer before the Indiana Board of Registration due to the fact that no code of ethics has been adopted in this state.

ENFORCEMENT COMMITTEE ACTIVITIES BEAR FRUIT

The report of Chairman G. R. Harr's committee on Enforcement definitely proves that an active professional engineers organization can be of assistance to the Engineers Registration Board in enforcing the Indiana Registration Law. The board has previously been handicapped in citing violators of the law due to lack of definite information regarding them.

Engineer Harr stated that an investigation had been made of the thirteen firms reported to him at the last meeting of the executive board with the result that some of them have since become registered, some have paid up delinquent renewal fees, and one firm announced its retirement from the engineering field. Information on firms which still failed to comply with the law was turned over to the Indiana Engineers Registration Board for their action.

MEMBERSHIP CONTINUES TO INCREASE

With the addition of thirteen new members reported at the July meeting, the membership of the Society has passed the three hundred and fifty mark. Our membership now includes approximately thirty per cent of the registered engineers in the state. Through the organization of local chapters in the larger cities it is hoped to extend our membership geographically with a resultant sizeable increase in the number of members.

NATIONAL VICE-PRESIDENT IN INDIANAPOLIS

Engineer Perry T. Ford national vice-president, was in Indianapolis July 13th and spent the afternoon with Pres. S. G. Cohen. Engineer Ford praised the Indiana Society for its work to date and offered his personal services to the Society at any time we should want to call on him.

SOCIETY ADOPTS RESOLUTIONS ON DEATH OF CHARTER MEMBER

In connection with the recent death of Charles Brossman, prominent Indianapolis engineer and a charter member of the Society, a resolution was presented at the July meeting by Engineer W. W. Hadley. This resolution of recognition and appreciation for his life of outstanding service to the engineering profession was adopted by the Society, and the secretary was instructed to send a copy of the resolution to the family of the deceased.

REGISTRATION RENEWALS DUE

All members of the Society are reminded that the renewal fees for Certificates of Registration are due on or before July 31st. In accordance with the Indiana Registration Law, all certificates of registration as a Professional Engineer or Land Surveyor expire on July 31st each year and shall be invalid from that date unless renewed. The renewal fee, if paid on or before July 31st, is five dollars ($5.00). Delayed renewals increase one dollar per month or fraction thereof, with a maximum renewal fee of ten dollars ($10.00). PAY YOUR RENEWAL NOW AND SAVE THE DELAYED RENEWAL FEE.

ADVERTISING SOLICITED FOR AMERICAN ENGINEER

A Communication has been received from Robert Hall Craig, editor of the American Engineer, requesting cooperation by the State Societies in securing advertising for the magazine. Both professional and industrial advertising are solicited.

Engineer V. E. Burkle, chairman of the committee on Public Relations, has a supply of rate cards which are available for any member who is willing to assist in securing advertising.

MEMBERS APPROVE NEW MEETING PLACE

Several of the members have commented on the comfortable and attractive quarters in the Indiana World War Memorial Building where the Society has convened the past two months.

Much of the credit for securing this meeting place should go to Engineer Frank Y. Hardy who has made the arrangements for the two meetings there. It is hoped that arrangements can be made to use the Memorial Building for a regular place of meeting.

REGISTRATION BOARD HEAD RESIGNS

Announcement has been made of the resignation, effective July 1st, of Engineer P. E. Middleton, Chairman of the Indiana State Board of Registration for Professional Engineers and Land Surveyors. He had been a member of the board for the past four years.

Engineer Middleton tendered his resignation for business reasons as his new work necessitated his transferring his residence to a neighboring state.

We regret to lose one of our Society members from the Board of Registration but our regret at this loss is tempered by the knowledge that his transfer is in the nature of a promotion. The best wishes of the Indiana Society of Professional Engineers are extended to Engineer Middleton in his new undertaking.

NEWS OF THE LOCAL CHAPTERS

CALUMET CHAPTER ELECTS OFFICERS

The recently organized Calumet Chapter of the Indiana Society of Professional Engineers has elected officers, and the new president reports that they have their chapter activities under way.

The officers of the Calumet Chapter are President, Frank Shutt, Consulting Engineer, Gary; Vice-President. Z. B. Campbell, City Engineer, East Chicago; Secretary, B. Hoffman, Right-of-Way Agent for State Highway Commission of Indiana Valparaiso; and Treasurer, E. M. Peck, Project Engineer for the Highway Commission, LaPorte.

Directors elected are J. G. Kraft, East Chicago; L. L. Dillingham, Valparaiso; Leo Besozzi, Hammond and E. E. Schoenbeck, Gary.

The News Letter will gladly publish items of interest concerning the local chapters. All news sent in for publication should be addressed to the Secretary, J. V. Smythe.

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Engineers A. L. Stadermann and G. C. Thompson, of Terre Haute, are to assemble the registered engineers of Vigo County with the view of forming a local chapter in that county.

KENTUCKY

Officers of the Kentucky Society of Professional Engineers:

President, George H. Sager, Jr., Louisville.

First Vice-President, D. V. Terrell, Lexington.

Second Vice-President, Paul M. Jones, Madisonville.

Secretary-Treasurer, C. S. Crouse, Lexington.

BOARD OF DIRECTION

O. S. Batten, Pikeville.....1937-38
Wm. A. V. Borries, Dawson Springs.....1937-38
B. M. Brigman, Louisville.....1937-38
Woolsey M. Caye, Louisville.....1937-38
C. S. Crouse, Lexington 1937
Paul M. Jones, Madisonville.....1937
J. H. Romann, Louisville.....1936-37
George H. Sager, Jr., Louisville 1936-37
H. L. Shearer, Lexington 1936-37
D. V. Terrell, Lexington.....1937
J. S. Watkins, Lexington.....1936-37
W. B. Wendt, Louisville.....1937

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H. K. Bell.....Lexington
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PRESIDENT'S LETTER

Louisville Ky.
June 15 1937.

Fellow Members of the Kentucky Society of Professional Engineers:

We are approaching the fourth anniversary of the founding of this organization by a group of representative engineers, who met in Frankfort in the fall of 1933. The aims and objectives of this association are well known to whose who have taken an active interest in the Society's welfare. Since its founding the Society has enjoyed a steady and healthy growth; few members have resigned, and I am given to understand that practically all have shown their interest by keeping up the annual dues.

Our Year Book will include approximately 160 names of engineers practicing in all of the specialized fields. To become an influence in this State we must enlist every professional engineer qualified to become a member. In this endeavor I ask you to join with me and expect each member to bring in at least one new applicant before January 1, 1938.

The flood of January and February of this year damaged approximately one third of all of the counties in the State; during that emergency the engineer was outstanding in every community in advising, directing and supervising the relief of the distressed. In addition, many of these men continued their efforts during the reconstruction period which followed. Such acts show us that the professional engineer is a necessary part of Society and can play an active part in every community regardless of its size. This drastic lesson should impress us all with the necessity of the engineer voluntarily giving a portion of his time for public service on matters of a technical nature. If each one of us would volunteer this service, not only would our own characters be strengthened and expanded, but our profession would also be recognized and elevated in the opinion of our people.

GEORGE H. SAGER, Jr.,
President.

MISSOURI

MISSOURI SOCIETY OF PROFESSIONAL ENGINEERS MEETING OF JULY 10, 1937

A high mark was set for future meetings of Mo. S. P. E., by the turnout and enthusiasm of the meeting held in Jefferson City on July 10th for permanent organization. The informal afternoon meeting drew thirty or more members who took active part in the discussion and listened with growing interest to the enlightening remarks of Willard S. Conlon, Secretary of the National Society, and to the experiences of C. A. Lashbrook, Secretary of the Oklahoma Society.

A get-together dinner meeting at McKinney's Cafe at 6:30 P. M. saw forty-three members and guests gather in the first of certainly many enjoyable banquets. Engineer A. H. Baum was the principal speaker for the banquet and described in detail the long fight for registration which ended in defeat at the last legislature.

At 8:30 P. M., the members gathered in the auditorium of the Public Library and went into a brass-tacks business session after Engineer Conlon and Engineer Lashbrook had presented further facts on the movement which we intend to support.

The effect of the remarks by the visitors was such that the Society framework was adjusted to fit the solid foundation which the National and other State Societies have provided. On this premise the Constitution was partially adopted and officers elected to start the machinery working. The list of officers is shown in the article on Committees.

Engineer Ray Adams was appointed chairman of a special committee to prepare the memoirs of Engineer Foster W. Harvey who passed to Eternal Rest in June. Engineer Harvey was one of the first to join the Society after its organization in January.

The final revision and approval of the Constitution was turned over to the Executive Board to complete.

ATTENTION MEMBERS!

Enclosed with this NEWS LETTER you will find a copy of the formal application blank. For purposes of completing our records it is necessary that you fill out this form completely and return it with your assessment of the balance of dues. An extra copy is provided so that you can turn it over to an engineer acquaintance and obtain his membership.

Also note that as soon as you have returned the application and balance of dues you will receive a Membership Card which will show that you are a Member in Good Standing. This is valuable to you so do not delay in completing your membership requirements.

W. H. McDILL,
Secretary-Treasurer.

OUR NEW SOCIETY

By: E. W. Carlton, President

The first Annual meeting of the Missouri Society of Professional Engineers was held in Jefferson City, Saturday, July 10, 1937. At this meeting a new spirit of cooperation and a consciousness of the need of organization seemed to prevail throughout the group. It was indeed an encouraging circumstance when a large representative group of Missouri engineers met and organized as a functioning unit to ascertain the problems which confront our profession and lay plans which will perfect methods for their solution.

Mere organization, however, should not be the end in itself. The merit and usefulness of our organization will depend upon its character, objectives and activities.

The following, in broad terms, is the objective of the Society as set forth in Article I, Section 2 of our Constitution: "The Object of the Society shall be the advancement of the profession of engineering in its several branches, the professional improvement of its mmbers, the promotion of the professional welfare of its members, the encouragement of social relations among engineers of the State of Missouri, and the sponsoring of adequate legislation for the protection of engineers and of the public against irresponsible and unethical practices."

Specific objectives to which we might aspire have been admirably set forth in a recent address by Dean W. H. Hitchler before the Harrisburg (Pennsylvania) Chapter of Registered Professional Engineers. They are as follows:

1. The requirement of adequate education, training and character for admission to our profession.
2. The driving of the unscrupulous and unfit out of the practice of our profession.
3. The protection of the public against the doing of engineering work by unauthorized or untrained persons.
4. The giving of advice and help to young engineers.
5. The post graduation education of engineers.
6. The establishment of state wide standards and ethics in engineering practice.

Today, the voice that is heard the views that carry weight and the opinions that are respected are those of organized groups. Therefore, the higher the character of our organization's personnel, the more vigorous and efficient will be its actions, and the greater will be the importance of the

character of its objectives. It is quite evident that our first aim should be to enlist into our ranks the best and most representative of the entire engineering profession in the State of Missouri. So let every member do his share toward increasing the size and scope of our membership.

You will find listed in another article in this News Letter, the various Committee Chairman appointments. It is our earnest desire that every member cooperate with all committees in furthering the work of building a strong State Society during the coming year.

The Board of Directors are laying plans to hold three regional meetings during the year, in addition to the summer Annual meeting to be held in Jefferson City. The tentative plan now includes a fall meeting in St. Louis, a winter meeting in the central part of the State and a spring meeting in Kansas City. Full details will be announced later.

Finally, the success or failure of our organization depends upon the active interest of every member. Suggestions and criticisms will always be gratefully appreciated by your Board of Directors. Let us all be boosters and work toward obtaining for the Engineering Profession of the State of Missouri the respect, dignity and influence commensurate with its ideals and accomplishments.

Do you have a specific aim for the Society? Let's have it, we want to hear from you and what you have to say about our work because we are working for you.

Address W. H. McDill, 208 Merchants Bank Bldg., Jefferson City, Mo.

EXECUTIVE BOARD MEETS

The first meeting of the Executive Board was called by President Carlton for July 21, and the following attended: E. W. Carlton, Joe B. Butler, M. E. Countryman, L. W. Helmreich, H. M. Brush, A. P. Learned, and W. H. McDill.

The principal matter of business was the final revision and approval of the Constitution and By Laws. The importance of this work is apparent and considerable time was devoted to achieving the best possible results.

President Carlton also presented for approval the chairman and members of the Standing Committees. These were not completed as it was realized that further study of the members would reveal those who are eligible for committee posts.

Some time was devoted to study of the details concerning the machinery of the Society and the Secretary was instructed to carry out the necessary plans.

The turnout for this meeting was gratifying to President Carlton and he also received letters from all other Board Members explaining their inability to attend and expressing regrets that they could not attend.

Continued interest on the level shown at this first meeting insures an active and progressive Society.

NEW MEMBERS

Each and every Member of this Society has one important duty to perform which he cannot fail to do and that is obtaining at least one new member as soon as possible. The success of this organization depends on its strength and only through expansion will it gain the needed strength and weight to carry it forward.

Study the qualifications necessary that are described on the application and then study engineers of your acquaintance. If they meet the requirements, contact them. Tell them what the Society will do; what it will do for you; what you want it to do; and how you expect it to do it. When you have done this you have contributed a great deal toward the mark we have set.

Engineer L. A. Pettus, St. Louis, has already asked for fifty application blanks. That's the spirit and we will be glad to furnish you with as many as you think you can use.

OFFICERS AND COMMITTEES

The following officers and Directors-at-Large were elected at the meeting on July 10: E. W. Carlton, President; F. W. Green, First Vice-President; C. W. Brown, Second Vice-President; G. H. Hamilton, Third Vice-President, and W. H. McDill, Secretary-treasurer. Directors-at-large: A. P. Green, H. E. Frech, H. M. Brush, M. E. Countryman, L. W. Helmreich, and A. P. Learned.

President Carlton appointed and the Executive Board approved the following for the Standing Committees:

Ethics and Practice: F. W. Green, Chairman, C. W. Brown, J. F. Porter, A. P. Green, M. S. Murray, L. H Dodd, Geo. M. Fowler.

Legislative and Enforcement: C. W. S. Sammelman, chairman, E. C. Wagner, Moss M. Edwards, committee to be completed later.

Public Relations: G. H. Hamilton, Chairman.

Membership: Joe B. Butler, Gen. Chairman; M. E. Countryman, Central Chairman; H. E. Frech, St. Louis, Chairman; A. P. Learned Kansas City, Chairman.

Chapter Activities: R. P. Cummins, Chairman.

Rules: R. E. Duffy, Chairman.

Aims and Activities: L. A. Pettus, Chairman.

Resolutions: James O. Lamb Chairman.

THANKS TO ENGINEER BUTLER

Every member of this Society who expects to gain one whit of results from its functions must thank Engineer Joe B. Butler, Retiring President, for the intense interest and driving action he has put into the formation of the organization. Contributing greatly of both time and personal funds, Engineer Butler may well claim the lion's share of any praise due to the original founders. A tough job was laid in his hands and he took hold with a vigor that demands respect. Let's not forget it.

Engineer N. W. Remley headed the committee which provided the arrangements for the meeting on July 10. Congratulations and appreciation of a fine of work are due to him.

NEW JERSEY

ANNUAL OUTING AND SHORE DINNER

The Monmouth-Ocean Society of Professional Engineers and Land Surveyors

This annual affair, usually a feature of Monmouth County Chapter, is to be expanded under State Association auspices, to provide entertainment and a social get-together of all the State Chapers.

The date Saturday, September 11, 1937, All day.

The cost: $2.50 (Stag)

The Place: Alice Clarkson's Restaurant State Highway, No. 4 Sea Girt.

Golf and Tennis Tournaments for the Athletes. Morning 10:00 o'Clock. Prizes. Horseshoe pitching, Soft Ball.

The Committee requests your prompt cooperation in sending in your reservations. Positively no dinners will be served without reservation and check.

Mail your check to Leo K. McKee, Chairman, 16 McLaren Street, Red Bank, N. J. Tickets will be mailed promptly. Entries for Golf and Tennis Tournaments must be made with the Committee. Give Club handicaps.

A special business meeting will be held at 4:00 o'Clock, limited to one hour.

NEW YORK

NEW YORK COUNTY CHAPTER NEWS

The Executive Committee has approved the suggestion of Engr. Emil Praeger, Chairman of the Committee on Programs and Publicity, to arrange for the next chapter meeting on the evening of October 5 on the 26th floor at 2 Park Ave., New York City. All Chapter members, as well as all recent licensees of New York County, will receive detailed announcements later.

The membership campaign in New York County will start simultaneously with the State campaign announced by President Roche. The county has been divided into sixteen zones for facilitating personal contact with persons eligible for membership. In addition to letters from the State Society and the County Chapter, each member will be asked to make personal contact with one or more prospects whose names will be given to him. Announcement of these activities will be mailed to each member after the completion of lists and selection of zone leaders. By this plan, each member will be able to conveniently contact men in his immediate vicinity. Increased membership, diversified in all the branches of the profession, is the most important present objective for the Society to attain and it is hoped that every one will work with this in view. It is felt that best results can be secured by personal contacts, since matters can be discussed and clarified more advantageously than by a form letter.

The Building Code Committee, consisting of Engr. Maurice Deutsch, Chairman and Engrs. Homer G. Balcom and John W. Pickworth presented a report to Mayor LaGuardia on the Building Code which was recently passed by the Board of Aldermen. The report, while it approved the measure as a great step forward, pointed out certain discrepancies between the Code and the Multiple Dwelling Law. The Executive Committee agreed that the Code should be the subject of closer study by the Building Code Committee so that a more comprehensive report could be submitted, if possible, at the next Chapter meeting.

Engr. John C. Fleming has been requested to continue his work as Chairman of the Civil Service Committee, taking into con-

sideration the Federal, as well as the State and Municipal Civil Service classifications.

Engr. Lester R. Waugh has requested that the Chapter make an effort to have the State and National Societies insist on the appointment of engineers to head Commissions which deal with engineering work. The State and National Societies have the facilities to make recommendations of qualified civilian engineers for such positions and the matter has been referred to President Roche for further action.

In response to letters from the State Education Department and from President Roche concerning violations of the Engineering Practice Act, a plan for extensive investigation has been submitted. It is felt that when insistance is made for registered engineers in responsible engineering positions, as defined by the Act, the prestige of the profession, as well as the membership of the Society will increase.

ENGINEERS REGISTERED IN NEW YORK STATE

The official figures of registrants in good standing in New York State, as of June 30, 1937, are as follows:

Professional Engineers ..	11,156
Land Surveyors	3,689
Total	14,845
Deduct for duplications (men registered as both P.E. and L.S.)	2,936
Net Total	11,909

SUFFOLK COUNTY CHAPTER

The annual mid-summer meeting of the Suffolk County Chapter, N. Y. State Society of Professional Engineers, was held recently at Montauk. The regular "kicker's handicap" golf tournament on the sporty Montauk Downs course opened the festivities in the afternoon. Engineers A. J. Edwards and Walter Fleming won first place in the match, with Engineers George Vaughan and Charles P. McFadden a close second. Charles McDonough and Carl Engelke made high score in the champagne tourney for visitors.

At 6.30 the members and guests gathered at Montauk Manor, where Engineer Thomas E. Ringwood had arranged an excellent seafood dinner. Swordfish, fresh from the ocean, sent with the compliments of Supervisor Perry Duryea, was the high spot of the banquet.

A brief business meeting followed with Vice-President Rodney E. Cook, sanitary engineer of the Suffolk County Health Department, presiding. Secretary Charles P. McFadden reviewed the activities of the executive committee during the past two months, and announced that four new members had been admitted since the last meeting. Treasurer Archibald S. Havens of Center Moriches presented his semi-annual report. Engineers George C. Haag of Islip, L. M. Raynor of Riverhead, Jack Whitby of East Hampton, E. M. Wolf of Southampton and D. R. Young of Riverhead gave brief reports. Fred J. Biele, consulting sanitary engineer of Huntington reported for the ethics and practice committee.

The next meeting of the chapter will be held at the Crescent Athletic Club at Huntington in September.

PENNSYLVANIA

PENNSYLVANIA SOCIETY OF PROFESSIONAL ENGINEERS

The *Pennsylvania Society of Professional Engineers,* a component of the National Society of Professional Engineers, wishes to send to its members and other interested registered engineers, and engineers who should be registered, information pertinent to their interests and that of the Profession.

Publication of such information in printed form or as a year book has been found to involve an unwarranted cost and an effort will be made to supply the information in mimeographed form.

This data can be punched and filed in standard binders now available at all chain stores at low cost and should be so kept available with the Roster issued by the State Registration Board.

Manifestly every engineer should have the interest of the public, his profession and himself at heart. He can best express such interest by affiliation with this Society and by active participation in its affairs.

The welfare of the country, our profession and individual selves is dependent to no small degree upon a professional engineers' militant organization; with your support our present success will be accelerated; without it we are forced to mark time.

If not a member, give this your most serious consideration.

* * * * * *

The *Pennsylvania Society of Professional Engineers* was organized by Professional Engineers in 1933 and incorporated under the laws of the Commonwealth of Pennsylvania in 1934.

Why Is Such A Society Necessary or Desirable?

There are about 3500 Registered Professional Engineers in the State of Pennsylvania most of whom are members of the various Engineering Technical Societies of their particular branch of engineering, such as Civil, Mechanical, Electrical, Mining, Chemical, etc. The technical problems of these engineers are divergent, but their professional problems are alike.

The Engineering Societies, with which most of our Professional Engineers may be affiliated, are generally technical in nature, little effort being made by them to promote the welfare of the engineer and the Engineering Profession.

Recognition of the Engineer and the promotion of his interests it was thought could best be attained by the union of all Professional Engineers in a single body.

The older Engineering organizations, which were organized for the advancement of the Engineering Profession along technical lines, have fulfilled their purpose excellently and still are doing so. It is not the purpose of this organization to trespass upon the chosen fields of these Societies, but to fortify the Engineer and safeguard him from a repetition of the plight in which he finds himself today.

The State Society is organized to do for the Engineer what the Bar Association and the Medical Association have done for their respective professions, in increasing prestige, legal protection and professional recognition.

These ideals can be accomplished with the united support of all Registered Engineers, each of whom should join the State Society.

Organization

The State Society, when organization is completed, will be made up of Chapters covering every County in the State. The boundaries of the jurisdictions of the Chapters will follow closely those of the political sub-divisions of the State. Charters for Chapters are granted upon the receipt of the application by five Registered Professional Engineers residing within the limits of the proposed Chapter's jurisdiction.

The State Society, together with other State Societies, compose the National Society of Professional Engineers. The National Society is organized to accomplish, in a nation-wide scope, the same objectives for which the State Society was organized.

Membership

Membership in the Society is limited to engineers who have been duly registered as Professional Engineers in the State of Pennsylvania and are in good standing as such. Membership is not open to Registered Surveyors.

Membership in the State Society includes membership in a Chapter selected by the applicant and makes one automatically a member of the National Society of Professional Engineers.

Dues

The Annual Dues of the State Society amount to $7.50 and include the National Dues, $3.00, the AMERICAN ENGINEER $1.00, the State Dues $2.00 and the Chapter Dues $1.50.

There is no initiation or admission fee.

Dues are adjusted to cover the calendar year, being $7.50 from January to June inclusive and $3.75 from July to December inclusive.

Dues may be compounded for life, as follows:

At age 55 and upwards	$ 86.73
At age 54 years	90.89
At age 53 years	94.89
At age 52 years	98.74
At age 51 years	102.44
At age 50 years and under ...	106.00

which sums are based on annual payment of $7.50 dues for twenty years or up to the age of 70.

The Philadelphia and Reading Chapters have made an additional local assessment of One Dollar for Chapter purposes, per annum.

The gold and enamel badge of the Pennsylvania Society of Professional Engineers will be mailed to members upon receipt of One Dollar by the Executive Secretary, 921 Widener Building, Philadelphia, Pa.

A Tentative Statement of Objectives as of June, 1937

1. To educate the public to a realization of the professional status of the registered engineer and to secure political recognition for the profession.
2. To restrict the designation "Engineer" to registered professional engineers and to prevent the performance of engineering duties by other than qualified registered engineers in either public or private work.
3. To elect engineers to public office.
4. To promote the participation of professional engineers in national, state and local affairs, and to cooperate with national, state and local governmental authorities and other interested groups in public service to the nation and its citizenry.
5. To secure the political inclusion of the professional engineer in the planning, development and operation of public projects

and national, state and municipal engineering works, and in the preparation of legislation pertaining thereto.

6. To conduct a planned campaign for the advancement of the engineering profession in public recognition, confidence and esteem.

7. To advance and protect the economic and professional interests of the engineer, individually and collectively, through united effort, legislation and public relations.

8. To supplement the functions of educational, technical and social engineering groups, societies, associations or clubs by public, political, legal, welfare, employment and similar activities designed to improve the status of the profession.

9. To initiate and promote legislation on behalf of the profession and to watch, report and fight any legislation, national, state or local, tending to injure the interests of engineers or to deprive them of any of their professional rights.

10. To help secure the enactment of a model uniform registration law in every State.

11. To help secure reciprocal registration between States.

12. To strengthen, unify, extend and enforce legislation in Pennsylvania protecting the public welfare, the practice of engineering and the designation "Engineer".

13. To protect the engineer against exploitation, unprofessional competition, unlawful encroachment and restriction of rights to practice.

14. To promote cooperative and fraternal relations within the profession.

15. To cooperate fully with all engineering groups and individuals toward professional unity and solidarity throughout the entire profession, regardless of specialty or classification.

16. To encourage better selective methods of admission of students to engineering schools and to elevate both entrance and graduation requirements.

17. To reduce any oversupply of engineers by promoting selective limitation of student enrollment in engineering schools.

18. To license engineering pupils and engineers-in-training.

19. To encourage and guide engineering pupils, engineering assistants and engineers-in-training.

20. To conduct an active planned campaign of publicity on behalf of the engineering profession.

21. To conduct a campaign to secure public credit and recognition for engineers in connection with their works.

22. To conduct a campaign to stimulate worthy engineering projects and public works and to promote increased demand for engineering services.

23. To improve conditions of employment and methods of engaging engineering services.

24. To build up and maintain an active State Society with politically distributed local chapters.

25. To cooperate actively with the National Society.

26. To organize, coordinate, unite and extend the activities of our local chapters.

27. To extend employment service.

28. To build up and administer a reserve fund for assisting engineers in economic distress, and to assist local units in critical legislative campaigns on behalf of the profession.

29. To encourage the publication of the AMERICAN ENGINEER in every way.

30. To raise the standards of compensation (fees and salaries) for engineering services.

31. To encourage and insist upon the registration of all eligible engineers engaged in engineering practice.

32. To encourage the membership in this Society of all eligible engineers.

Specific Present Objectives

1. New Local Chapters.

2. Increased membership.

3. Advocacy of law requiring seal of registered engineer or architect on all plans submitted to governmental authorities.

4. Approval of suggested schedule of remuneration.

5. Approval of any action tending to the proper use of terms "Engineer" and "Engineering".

6. Protection of engineers' interests in existing emergency conditions.

Any information concerning this organization will be gladly given by any member or by

T. W. BATTIN,
Executive Secretary,
921 Widener Building,
Philadelphia, Penna.

PENNSYLVANIA SOCIETY OF PROFESSIONAL ENGINEERS
SCHEDULE OF REMUNERATION

Prepared by a committee of which Engineer Lawrence Costello, 408 E. Wadsworth Street. Philadelphia, Pa., is chairman.

SALARIES:

Grade 1. Engineering Assistant.

Duties: Under immediate supervision, to assist on engineering work in field or office; make simple measurements and sketches; make and check simple computations; make tracings and simple drawings from sketches and record plans; do neat lettering of various forms; assist in the compilation of engineering data; assemble and file engineering plans, specifications and records; perform the usual work of a Rodman, Chainman, Tracer or Junior Draftsman.

Requirements: Education equivalent to graduation from a high school.

Salary: $30 to $50 per week.

Grade 2. Junior Engineer.

Duties: Under supervision, to perform technical work in the office or field requiring a knowledge of engineering practices and methods; make working drawings and designs and prepare estimates; make computations of a technical character; perform minor surveys and construction inspection. This classification includes the position usually called Levelman, and the lower grades of Draftsman and Inspector.

Requirements: Education equivalent to graduation from a college or technical school of recognized standing; thorough knowledge of care, operation and adjustment of engineering instruments and apparatus; ability to design simple engineering structure.

Salary: $40 to $60 per week.

Grade 3. Junior Assistant Engineer.

Duties: Under supervision, to take charge of a field party, a drafting squad, or inspection of construction; to make and check quantity and cost estimates; to lay out work and draw plans and detail drawings; to check working drawings and fabricators' details; to keep records; to make reports. This classification includes the higher grades of Draftsman and the positions usually called Transitman, Engineering Inspector, Detailer, Checker, Squad Boss, and Chief of Party.

Requirements: Education equivalent to graduation from a college or technical school of recognized standing, plus about three years of experience in engineering work; ability to exercise engineering judgment and skill; ability to plan operations in office or field.

Salary: $50 to $75 per week.

(Note: Registration not required for the preceding positions).

Grade 4. Assistant Engineer.

Duties: To perform important engineering work in office or field requiring the exercise of independent engineering judgment and skill; to make studies, estimates and reports; to prepare designs and specifications; to supervise the work of draftsmen, or of field parties or a group of inspectors on construction work. This classification includes the positions usually designated as Designer or Designing Engineer.

Requirements: Education equivalent to graduation from a college or technical school of recognized standing, plus about five years of experience in engineering work of which at least one year shall have been in responsible charge; and possession of a license as a Professional Engineer in states having an engineer license law.

Salary: $75 to $150 per week.

Grade 5. Engineer.

Duties: To be in responsible charge of a minor engineering organization or to have immediate administrative and technical charge of a division (comprising several squads or parties in office or field) in large organization; to plan, direct and supervise the design or construction of engineering projects; to supervise the preparation of contracts and specifications and to be entirely responsible for the engineering, construction and business operations of his division, bureau, section or department; to have immediate responsible supervision of the work of draftsmen, designers, and assistant engineers. This classification also includes the positions usually designated as Resident Engineer and Section Engineer.

Requirements: A first-class technical education, plus about eight years of professional experience in the active practice of engineering; ability to plan, design, and supervise the enginering work; and possession of a license as a Professional Engineer.

Salary: $100 to $200 per week.

Grade 6. Assistant Chief Engineer.

Duties: To be in responsible professional and executive charge of a major division of work on a large engineering project, involving planning, designing, and supervision of construction; to give independent, critical engineering advice for executive action incidental to such work; to assume professional and executive responsibility for the whole of a smaller engineering project. This classification also includes the positions usually designated as Division Engineer and Senior Engineer.

Requirements: A first-class technical education supplemented by cultural and economic studies, plus about twelve years of broad professional experience embracing a thorough knowledge of engineering office methods, field work, design, construction and business administration, and possession of a license as a Professional Engineer.

Salary: $150 to $300 per week.

Grade 7. Chief Engineer.

Duties: To have entire charge of and be responsible for entire organizations comprising more than one engineering division and

engaged in more than one class of work; to determine and establish technical and administrative policies and procedures; to be responsible for all engineering design, construction and business operations; and to investigate all engineering projects submitted for consideration and report critically regarding feasibility, cost, economic justification, and public necessity or convenience.

Requirements: A first-class technical education, supplemented by cultural economic and social studies, plus about fifteen years of broad professional experience embracing a thorough knowledge of engineering office methods, field work, planning, design, construction, maintenance, operation, engineering economics, contract law and business administration; recognized standing in the engineering profession; and possession of a license as a Professional Engineer.

Salary: $250 to $1000 per week.

APPLICATION

1. This schedule, covering classifications of engineering positions and salaries, is intended to apply to the entire state of Pennsylvania without distinction for metropolitan areas.

2. The designations indicated for the respective classifications in the foregoing schedule are merely for convenience of reference, and have no significance in the application of the schedule.

3. In determining the classification of any engineering positions by the foregoing schedule, the duties performed and not the designations applied shall govern.

4. The qualification requirements specified for the respective classifications are minimum. Higher qualifications shall not preclude acceptance of employment in a lower classification.

5. The salaries specified in the foregoing schedule are hereby established by the Pennsylvania Society of Professional Engineers as the proper rates of compensation for engineering employes working in the respective classifications in the Commonwealth of Pennsylvania. Salaries below the range specified in the foregoing schedule for any classification shall be regarded as inadequate and sub-standard.

6. The ranges of salaries specified for the respective classifications in the foregoing schedule are intended to provide leeway to cover differences in magnitude and importance of the work, in the efficiency and responsibility of the individual and in his length of experience in the classification.

7. The ranges of salaries specified in the foregoing schedule have been determined as fairly representing the prevailing salaries for the respective classifications in the Metropolitan Region of New York as of 1930. The salaries herein established are based on the salary surveys made by the Committee on Salaries of the American Society of Civil Engineers from 1930 to 1934, and on the statistical studies made by the Metropolitan Regional Committee's Sub-Committee on Salary Statistics from 1933 to 1934.

CHARGES FOR ENGINEERING SERVICES AND METHODS OF COMPUTING SAME

A special committee on fees of the American Society of Civil Engineers made two reports in 1930, entitled "Manuals of Engineering Practice" numbers 5 and 6. Both cover the same ground, except that No. 6 is prepared for the use of clients, whereas No. 5 contains much more material and is for the use of the Engineer himself. The matters included in the various methods of charges and those excluded are set forth in detail in these reports. Seven methods of making charges are set up in these reports, and some portions of the reports are used herein.

PERCENTAGE OF COST

The following recommended rates include preliminary studies, investigation and report on the project; preparation of plans; estimates of quantities and cost; specifications; award and execution of contracts; supervising and laying out of the work by the principals; computations of estimates; consultation and advice to Client during construction, including also general direction of the work to its conclusion. They do not include resident supervision; shop or field inspection of materials or construction; assessment maps; purchasing or management; borings; soundings, tests, analyses, and costs incidental to such matters. In frequent cases there should also be an additional charge for preliminary surveys, studies and reports.

The recommended schedule of minimum rates is as follows:

Net Cost of Works	*Percentage of Cost as Minimum Rate for Charges*
Less than $ 10,000	10 %
10,000 to 25,000	10 % to 9½%
25,000 to 50,000	9½% to 8 %
50,000 to 100,000	8 % to 6½%
100,000 to 250,000	6½% to 5½%
250,000 to 1,000,000	5½% to 4½%

If the construction work is in a number of separate contracts or is of a very intricate or highly specialized character, the rates are to be increased. If the construction work is of a very simple character the rates may be reduced.

Payments on account to be made as follows:

Payment upon submission of preliminary report	30%
Payment upon submission and approval of plans and specifications, a total of	70%
Balance of payments to be made monthly as work progresses to reach, upon completion of work ..	100%

FIXED SUM FEE

The Lump Sum Fee for engineering charges is sometimes used. It enables a Client to ascertain in advance the cost of engineering services, but it introduces difficulties and unfairness to the Engineer or to the Client if the original project is increased or diminished in size, or if the work is carried over a longer period than at first contemplated. Therefore, in service of this kind, the agreement should provide:

(a) For payment of services beyond a specified period of time.

(b) For additional payment in case the original project is expanded.

(c) For reduction in payment in case the conditions are the reverse of those described above under (a) and (b).

The Lump Sum Fee Method of payment is approved. The fee to be based on the percentage of cost as shown above under *Percentage of Cost*, upon carefully estimated cost of the project.

Fixed Lump Sum Fee charges may also be made for special classes of engineering services, as consultation, arbitration, professional advice, expert testimony, valuations, and appraisals, material and efficiency tests, reports and design.

"PER DIEM" RATES

The per diem basis of computing professional fees is well adapted to work involving irregular personal service and is quite generally used.

Charges for expert testimony and court work will vary greatly according to the character of the work involved. The following rates are recommended:

In court work, two classes should be observed in charges, as follows:

(a) Per diem for court attendance, $30 to $100. The full per diem rate is payable for a day or any part of a day that attendance is required in court whether or not the witness testifies.

(b) Per diem rate for preparation for case and conference with Counsel or Client $30 to $50. The per diem rate is payable for days or parts of days when the Engineer is preparing the case or is engaged with Counsel or Client, in the preparation of the case.

Per diem rates also apply to many classes of special engineering services, as consultation, arbitration, professional advice, valuations and appraisals, material and efficiency tests, reports and designs.

It is recommended that for these various classes of service the following designated charges prevail, the same to be fixed in accordance with the value of the service.

Per Diem Rate: $30 to $100.

The per diem rate of compensation also applies to many classes of work carried on in field and office, chiefly land surveying work and the drafting and computing in connection therewith.

Field Rates:

Field Party of two men $50. per day, and for each additional man $15. per day.

Office Rates:

$5.00 per hour; no less than $30.00 per day.

Minimum charge for party for field work, regardless of shortness of time, $20.00.

A minimum of $25.00 per day or fraction thereof shall be charged for Court Attendance.

SALARY FOR PART TIME SERVICE

This method of compensation is used very largely by municipalities in the employment of engineering services, but does not apply to engineers employed on a salary basis for full time service. The method is also of value at times in furnished private service.

Every public body employing part time engineering service on a unit basis should set up a definite sum in salary for the engineer for the year. This sum would be variable depending upon the size of the municipality, the prospect of work involved, probable necessity for attendance at meetings, and importance of the projects.

The salary thus paid to cover attendance at meetings, general preliminary advice, correspondence, etc. Such salary is to be in addition to regular engineering fees such as may be agreed upon under methods herein described under "Charges for Engineering Service, etc.", "Fixed Sum Fee" and "Per Diem Rates."

RETAINING FEES

The employment of a retaining fee as part payment for engineering services is recommended. This would be a fee set up for preliminary consultation and advice with and by the engineer in relation to a proposed construction operation.

If the project matures and construction is carried on, the retaining fee may be absorbed into the total payments for engineering services.

CONTINGENT FEE

This method of computing compensation is not recommended. It is difficult to compute compensation for professional service contingent on the benefits which may accrue therefrom.

The following Professional Engineers were registered in Pennsylvania, June 15, 16, 1937:

Aiken, Robert W.
110 Wilmont Avenue, Washington, Pa.

Bauer, Geo. F.
156 West Washington St., Rochester, Pa.

Baum, Marc
934 Woodlawn St., Scranton, Pa.

Bell, William S.
c/o Tilghman Moyer Co., 141 N. 9th St., Allentown, Pa.

Bloom, Seth W.
P. O. Box 307, Clearfield, Pa.

Brandt, John F.
510 Wheeler Ave., Scranton, Pa.

Bratton, Edward E.
215 Herr St., Harrisburg, Pa.

Brokenshire, W. S., Jr.
327 W. Federal St., Allentown, Pa.

Brown, Albert A.
5735 Hobart St., Pittsburgh, Pa.

Chase, Rolland W.
Summit Ave., Quarryville, Pa.

Crouse, M. W.
McConnellsburg, Pa.

DeLong, Gregg A.
c/o Carnegie-Illinois Steel Corp., 434 Fifth Ave., Pittsburgh, Pa.

Denig, Fred
Koppers Building, Pittsburgh, Pa.

Dodge, Karl F.
1811 Anna St., New Cumberland, Pa.

Ferguson, Harold K.
1650 Hanna Building, Cleveland, Ohio.

Fulton, James S.
431 Maple Lane, Shields, Pa.

Fulweiler, Walter H.
1600 Arch St., Philadelphia, Pa.

Garman, Warren DeWitt
College Park, Lewisburg, Pa.

Glace, Maurice C.
217 Maple St., Hershey, Pa.

Graham, A. Kenneth
Medical Arts Building, Jenkintown, Pa.

Gruenwald, Andrew
50 W. Houston St., New York City, N. Y.

Hartmann, E. C.
1025 Manor Road, New Kensington, Pa.

Hill, Charles S., Jr.
1337 Somerset St., Philadelphia, Pa.

Howell, Francis M.
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PITTSBURGH CHAPTER

Chapter Publications Committee—Editors
610 Maloney Bldg., 309 Fourth Ave., Pittsburgh, Pa.

The next Chapter Meeting will be held on Thursday evening, Sept. 16, 1937. The Chapter will be indebted to Engr. Paine for a very interesting evening on this date. Due to his efforts, arrangements are about complete for a movie illustrated talk, which we believe will be of considerable interest to all.

* * * * * *

EDITORIAL

Engineer T. W. Battin, Executive Secretary has sent to the Chapters, a tentative statement of objectives, among which six are listed as "Specific Present Objectives."

1. New Local Chapters.
2. Increased Membership.
3. Advocacy of law requiring seal of registered engineer or architect on all plans submitted to governmental authorities.
4. Approval of suggested schedule of remuneration.
5. Approval of any action tending to the proper use of terms, "Engineer" and "Engineering."
6. Protection of engineers' interests in existing emergency conditions.

Engineers! The staff and command can point out the objectives but to occupy them, it is "over the top and at them." We the privates must forward, mop up, consolidate and forward again to new objectives.

The summation of every day Professional acts of us individual engineers makes the resultant public judgment as to the value of Professional Engineering Service. The Society may point out the proper action but after all it is individual personal action which counts. The responsibility for this action is completely on your individual shoulders. See to it your Professional Actions are above reproach.

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